

FINAL REPORT NUMBER 201U-MGA-04-06

SAFETY COMPLIANCE TESTING FOR FMVSS 201U
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection

LAND ROVER IN THE UK
2004 LAND ROVER FREELANDER SE MPV
NHTSA No. C40602

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083



Test Dates: April 20-21, 2004
Report Date: April 23, 2004

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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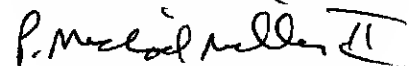
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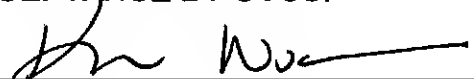


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18. Abstract A compliance test was conducted on the subject 2004 Land Rover Freelander SE MPV, NHTSA No. C40602, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U compliance. The test was conducted at MGA Research Corporation in Troy, Michigan on April 20-21, 2004. Test failures identified were as follows: <p align="center">AP3 (Right)</p> The data recorded seems to indicate that the 2004 Land Rover Freelander SE MPV tested does not appear to comply with the requirements for FMVSS 201U which were set forth by the National Highway Traffic Safety Administration.			
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact compliance test was to determine whether the subject vehicle, a 2004 Land Rover Freelander SE MPV, meets the performance requirements of FMVSS 201U, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on April 20-21, 2004 on a 2004 Land Rover Freelander SE MPV, manufactured by Land Rover in the UK.

All tests were conducted in accordance with the U. S. Department of Transportation, National Highway Traffic Safety Administration's Laboratory Test Procedure TP-201U-01 dated April 3, 1998 and the corresponding MGA Research Corporation's FMVSS 201U procedure number MGATP201U_FRAME#2 dated March 20, 2003.

All tests were conducted at MGA Research Corporation in Troy, Michigan and were performed by MGA engineers and technicians. The FMVSS 201U impactor test machine was used to conduct the testing. Target locations were determined by using a Coordinate Measurement Machine in conjunction with the MGA EZ-Target™ program and MGA procedure MGATP201U_Test Series dated March 20, 2003.

2.0 COMPLIANCE TEST DATA SUMMARY

The 2004 Land Rover Freelander SE MPV was equipped with A, B, C, and Rear-pillars, grab handles above all doors except the driver, an adjustable seat belt anchor on each B-Pillar, a fixed seat belt anchor on each C-Pillar, front upper roof light console, center upper roof light, and cargo nets.

Upon completion of targeting the test vehicle, ten (10) targets were chosen to be impacted based upon engineering judgment and certification test data provided by Land Rover. Targets were chosen which appeared most likely to give high HIC(d) values. The ten (10) targets chosen were:

AP1	BP2	SR2(A)-Left	UR6
AP3	BP3	SR2(A)-Right	
BP1	OP1	UR5	

The 2004 Land Rover Freelander SE MPV tested does not appear to comply with the performance criteria for FMVSS 201U. The HIC(d) measured using the Part 572L (Free Motion Headform) was above 1000 for Target AP3 (Right).

TABLE 2-1
SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Land Rover Freelander SE MPV

VEH. NHTSA NO.: C40602 VIN: SALNY22254A412481 COLOR: White

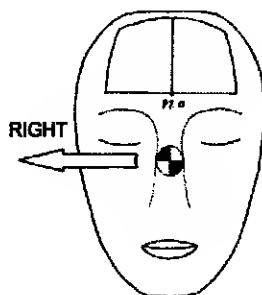
VEH. BUILD DATE: January, 2004 TEST DATES: April 20-21, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, George Baker, Scott Kreiger,
Darrell Steger

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Right	109	30	24.0	831	880	10	5 Left
AP3	Right	152	31	23.9	1062	1187	15	14 Right
BP1	Left	270	10	23.9	676	675	50	11 Left
BP2	Right	90	3	23.9	714	725	7	8 Left
BP3	Left	270	1	23.7	571	536	17	3 Right
OP1	Right	90	0	23.9	689	893	27	4 Right
SR2(A)	Left	270	24	23.9	626	809	20	10 Left
SR2(A)	Right	90	45	24.1	748	768	3	14 Left
UR5	Right	90	36	23.5	589	560	54	0
UR6	Right	90	38	23.6	769	799	14	12 Left

Above and left/right refers to the position relative to reference pt. 0 where the target made contact with the Free Motion Headform. See the diagram below for details.



POST TEST COMMENTS:

The following description lists any post-test damage or other test observations for each target.

AP3 Right: No visible damage. Apparent test failure.

BP1 Left: B-Pillar trim was compressed into the side rail.

BP2 Right: The seat belt anchorage cover was cracked during impact.

SR2(A) Left: Slight headliner deformation.

SR2(A) Right: The grab handle was compressed into the side rail.

UR5 Right: The B-Pillar trim was compressed.

No damage was observed for any other targets.

REMARKS:

The targets listed were impacted in the following order:

Right: AP3, AP1, SR2(A), BP2, UR5, OP1, UR6

Left: BP3, BP1, SR2(A)

The 150 mm rule was observed for targets horizontal to each other and the 200 mm rule was observed for vertical components.

RECORDED BY: David G. Gotwals

DATE: April 21, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-2
GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Land Rover Freelander SE MPV

VEH. NHTSA NO.: C40602 VIN: SALNY22254A412481 COLOR: White

VEH. BUILD DATE: January, 2004 TEST DATES: April 20-21, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, George Baker, Scott Kreiger, Darrell Steger

INTERIOR TRIM INFORMATION: A, B, C, and Rear-pillars, grab handles above all doors except the driver, an adjustable seat belt anchor on each B-Pillar, a fixed seat belt anchor on each C-Pillar, front upper roof light console, center upper roof light, and cargo nets.

SUNROOF INFORMATION:

Installed: Yes X No

Operation: Electric Manual

ROLL-BAR INFORMATION:

Installed: Yes X No

Padded: Yes X No

Braces: Yes X No

GENERAL INFORMATION:

Date Received: April 14, 2004; Odometer Reading: 21 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Land Rover in the UK

Date of Manufacture: January, 2004; VIN: SALNY22254A412481

GVWR: 2060 kg; GAWR FRONT: 1080 kg;

GAWR REAR: 1120 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 207 kpa REAR: 207 kpaRecommended Tire Size: 215/65R16

Recommended Cold Tire Pressure:

FRONT: 207 kpa REAR: 207 kpaSize of Tire on Test Vehicle: 215/65R16Type of Spare Tire: 195/80R15; Space Saver: X; Standard

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ; Bucket X; Split Bench Number of Occupants: Front 2; Rear 3; TOTAL 5VEHICLE CAPACITY WEIGHT (VCW) = 387 kgNo. of Occupants x 68 kg = 340 kgRated Cargo/Luggage Weight (RCLW) = 47 kg (difference)

WEIGHT OF TEST VEHICLE AS DELIVERED AT LABORATORY: (with maximum fluids)

Right Front = 466.0 kg Right Rear = 353.5 kgLeft Front = 462.0 kg Left Rear = 357.0 kgTOTAL FRONT = 928.0 kg TOTAL REAR = 710.5 kg% Total Weight = 55.6 % % Total Weight = 43.4 %TOTAL DELIVERED WEIGHT = 1638.5 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1638.5 kgRated Cargo/Luggage Weight = 47.0 kgTarget Test Weight = 1685.5 kg

WEIGHT OF TEST VEHICLE:

Right Front =	<u>466.0</u> kg	Right Rear =	<u>376.5</u> kg
Left Front =	<u>461.5</u> kg	Left Rear =	<u>379.5</u> kg
TOTAL FRONT =	<u>927.5</u> kg	TOTAL REAR =	<u>756.0</u> kg
% Total Weight =	<u>55.0</u> %	% Total Weight =	<u>45.0</u> %
TOTAL TEST WEIGHT = <u>1683.5</u> kg			
Weight of ballast secured in vehicle's cargo area = <u>47.0</u> kg			

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 785.0 mm; Left Front 783.0 mm;
 Right Rear 795.0 mm; Left Rear 803.0 mm;
 Pitch Angle at Right Door Sill = 0.0
 Pitch Angle at Left Door Sill = 0.3 Rear higher
 Roll Angle at Front Bumper = 0.0
 Roll Angle at Rear Bumper = 0.5 Left higher

FULLY LOADED: Right Front 782.0 mm; Left Front 788.0 mm;
 Right Rear 791.0 mm; Left Rear 789.0 mm;
 Pitch Angle at Right Door Sill = 0.2 Rear higher
 Pitch Angle at Left Door Sill = 0.4 Rear higher
 Roll Angle at Front Bumper = 0.2 Left higher
 Roll Angle at Rear Bumper = 0.5 Left higher

AS TARGETED: Right Front 963.0 mm; Left Front 966.0 mm;
 Right Rear 971.0 mm; Left Rear 971.0 mm;
 Pitch Angle at Right Door Sill = 0.1 Rear higher
 Pitch Angle at Left Door Sill = 0.3 Rear higher
 Roll Angle at Front Bumper = 0.1 Left higher
 Roll Angle at Rear Bumper = 0.5 Left higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = 0.1 Rear higher
 Pitch Angle at Left Door Sill = 0.3 Rear higher
 Roll Angle at Front Bumper = 0.1 Left higher
 Roll Angle at Rear Bumper = 0.5 Left higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill = 0.1 Rear higherPitch Angle at Left Door Sill = 0.3 Rear higherRoll Angle at Front Bumper = 0.1 Left higherRoll Angle at Rear Bumper = 0.5 Left higherVEHICLE WHEELBASE = 2575 mm

REMARKS: The seat travel distance was measured to be 234 mm for the driver front seat and 234 mm for the passenger front seat.

RECORDED BY: David G. GotwalsDATE: April 15, 2004APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Land Rover Freelander SE MPVVEH. NHTSA NO.: C40602 VIN: SALNY22254A412481 COLOR: WhiteVEH. BUILD DATE: January, 2004 TEST DATES: April 20-21, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, George Baker, Scott Kreiger, Darrell Steger

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

	HORIZONTAL ANGLE SPECIFIED RANGE	MINIMUM HORIZONTAL ANGLE	MAXIMUM HORIZONTAL ANGLE
A-PILLAR	L 195°-255°	L 206.9°	L 251.6°
	R 105°-165°	R 108.8°	R 152.5°
B-PILLAR	L 195°-345°	L 195.0°	L 278.0°
	R 15°-165°	R 82.4°	R 165.0°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: David G. GotwalsDATE: April 15, 2004APPROVED BY: Helen A. Kaletto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Land Rover Freelander SE MPVVEH. NHTSA NO.: C40602 VIN: SALNY22254A412481 COLOR: WhiteVEH. BUILD DATE: January, 2004 TEST DATES: April 20-21, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, George Baker, Scott Kreiger, Darrell Steger

VERTICAL IMPACT ANGLE RANGES

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
FRONT HEADER	FH1	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
	FH2	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
SIDE RAIL	SR1	L 0°-50°	L 0°	L 40°
		R 0°-50°	R 0°	R 42°
	SR2(A)	L 0°-50°	L 0°	L 24°
		R 0°-50°	R 0°	R 45°
	SR2(B)	L 0°-50°	L 0°	L 24°
		R 0°-50°	R 0°	R 44°
	SR3-1	L 0°-50°	L 0°	L 41°
		R 0°-50°	R 0°	R 41°
	SR3-2	L 0°-50°	L 0°	L 38°
		R 0°-50°	R 0°	R 38°
A-PILLAR	AP1	L -5°-50°	L -5°	L 30°
		R -5°-50°	R -5°	R 30°
	AP2	L -5°-50°	L -5°	L 43°
		R -5°-50°	R -5°	R 43°
	AP3	L -5°-50°	L -5°	L 31°
		R -5°-50°	R -5°	R 31°

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
B-PILLAR	BP1	L -10°-50°	L -10°	L 10°
		R -10°-50°	R -10°	R 9°
	BP2*	L 0°-50°	L 0°	L 3°
		R 0°-50°	R 0°	R 3°
	BP3	L -10°-50°	L -10°	L 1°
		R -10°-50°	R -10°	R 2°
	BP4	L -10°-50°	L -10°	L -6°
		R -10°-50°	R -10°	R -6°
OTHER PILLAR	OP1*	L 0°-50°	L 0°	L 0°
		R 0°-50°	R 0°	R 0°
	OP2	L -10°-50°	L -10°	L 0°
		R -10°-50°	R -10°	R 0°
UPPER ROOF 1		0°-50	0°	50°
UPPER ROOF 2		0°-50	0°	38°
UPPER ROOF 3		0°-50	0°	37°
UPPER ROOF 4		0°-50	0°	41°
UPPER ROOF 5		0°-50	0°	36°
UPPER ROOF 6		0°-50	0°	38°

As determined using the Procedures specified in S8.13.4.2. *Targets BP2 and OP1 are seat belt anchorage locations.

RECORDED BY: David G. Gotwals

DATE: April 14, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Land Rover Freelander SE MPVVEH. NHTSA NO.: C40602 VIN: SALNY22254A412481 COLOR: WhiteVEH. BUILD DATE: January, 2004 TEST DATES: April 20-21, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, George Baker, Scott Kreiger, Darrell Steger

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	234.0 mm	234.0 mm
T°	Horizontal < {CG-F1 (Left Seat) to (Right A-Pillar)}	108.4°	--
A1°	360° - T°	251.6°	--
W°	Horizontal < (CG-2 (Left Seat) to (Left A-Pillar))	206.9°	--
A2°	A2° = W°	206.9°	--
U°	Horizontal < (CG-2 (Left Seat) to (Left B-Pillar))	278.0°	--
B1°	B1° = U°	278.0°	--
V°	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	195.0°	--
B2°	B2° = V°	195.0°	--
W° (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	152.5°
A1° (right)	A1° (right) = W° (right)	--	152.5°
T° (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	251.2°
A2° (right)	360° - T° (right)	--	108.8°
V° (right)	Horizontal < (CG-R (Right Seat) to (Right B-Pillar))	--	165.0°
B1° (right)	B1° (right) = V° (right)	--	165.0°
U° (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	82.4°
B2° (right)	B2° (right) = U° (right)	--	82.4°
J	A-Pillar {(Plane 3) - (Plane 5)}	381.6 mm	379.4 mm
J/2	J ÷ 2	190.8 mm	189.7 mm
D1	Upper Roof {(Plane A) - (Plane B)}	2120.0 mm	
D1/2	D1 ÷ 2	1060.0 mm	
D2	Upper Roof {(Plane C) - (Plane D)}	1163.1 mm	
D2/2	D2 ÷ 2	581.6 mm	
.35D1	.35 x D1	742.0 mm	
.35D2	.35 x D2	407.1 mm	

Measurement	Description	Left Side	Right Side
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	495.4 mm	497.8 mm
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	247.7 mm	248.9 mm
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	123.9 mm	124.5 mm
Q	O-Pillar (Plane 13 – Place 14)	489.9 mm	492.0 mm
Q/2	Q / 2	245.0 mm	246.0 mm
D	R-Pillar (Point 7 – Point M)	855.0 mm	855.0 mm
D / 2	D / 2	427.5 mm	427.5 mm
3D/7	3xD / 7	366.4 mm	366.4 mm

As determined using the Procedures specified in S10.1-10.13.

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2339.0	-345.0	552.0	2339.0	345.0	552.0
Rear Row	3140.0	-390.0	582.0	3140.0	390.0	582.0

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2339.1	-345.4	551.3	2339.6	344.1	551.3
Rear Row	3141.3	-391.0	579.6	3141.8	388.4	579.6

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	2265.1	-345.4	1211.3	2265.6	344.1	1211.3
CGF2	2499.1	-345.4	1211.3	2499.6	344.1	1211.3
CGR	3301.3	-391.0	1239.6	3301.8	388.4	1239.6

REFERENCE FOR VEHICLE COORDINATE SYSTEM:

Passenger door striker upper bolt hole (x, y, z) = (2459.8, 761.4, 681.0)

RECORDED BY: David G. Gotwals

DATE: April 15, 2004

APPROVED BY: Helen A. Kalet

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2004 Land Rover Freelander SE MPVVEH. NHTSA NO.: C40602 VIN: SALNY22254A412481 COLOR: WhiteVEH. BUILD DATE: January, 2004 TEST DATES: April 20-21, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, George Baker, Scott Kreiger, Darrell Steger

SUMMARY OF TARGETING RESULTS								
Target	Locotion (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
A-Pillar Left Side								
AP1	2080.4	-516.8	1313.5	251	30	No	--	No
AP2	1999.0	-606.9	1224.8	207	43	No	--	No
AP3	1845.8	-647.8	1122.2	207	31	No	--	No
A-Pillar Right Side								
AP1	2079.8	-518.0	1312.0	109	30	No	--	Yes
AP2	2000.1	606.4	1224.2	152	43	No	--	No
AP3	1847.7	644.9	1123.2	152	31	No	--	Yes
B-Pillar Left Side								
BP1	2591.8	-478.5	1380.4	270	10	No	--	Yes
BP2	2568.4	-598.1	1122.1	270	3	No	--	No
BP3	2516.6	-604.4	1133.0	270	1	No	--	Yes
BP4	2607.6	-654.0	1010.2	195	-6	No	--	No
B-Pillar Right Side								
BP1	2593.8	477.2	1381.9	90	9	No	--	No
BP2	2568.9	598.1	1124.2	90	3	No	--	Yes
BP3	2516.4	598.9	1133.6	90	2	No	--	No
BP4	2607.4	655.2	1010.4	165	-6	No	--	No
Other Pillar Left Side								
OPR	3384.1	-476.6	1407.3	--	--	No	--	No
OP1	3413.4	-616.4	1153.8	270	0	No	--	No
OP2	3435.3	-615.1	1162.1	270	0	No	--	No

SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
Other Pillar Right Side								
OPR	3388.8	473.0	1408.5	—	--	No	--	No
OP1	3418.3	615.4	1155.2	90	0	No	--	Yes
OP2	3434.6	613.7	1161.8	90	0	No	--	No
Rear Pillar Left Side								
RP1	3860.7	-490.0	1390.4	Exempt from testing				
RP2	3944.1	-590.6	1241.3	Exempt from testing				
Rear Pillar Right Side								
RP1	3868.8	492.8	1386.7	Exempt from testing				
RP2	3947.7	587.1	1237.4	Exempt from testing				
Front Header Left Side								
FH1	2006.5	-403.5	1339.6	180	50	No	--	No
FH2	1982.1	-254.4	1344.4	180	50	No	--	No
Front Header Right Side								
FH1	2003.9	396.1	1340.8	180	50	No	--	No
FH2	1979.0	245.5	1345.9	180	50	No	--	No
Side Rail Left Side								
SR1	2231.1	-497.0	1357.4	--	--	Yes	--	--
REL	2230.0	-459.3	1368.9	270	40	--	2	No
SR2(A)	2379.4	-491.4	1371.6	--	--	Yes	--	Yes
REL	2379.1	-505.3	1359.6	270	24	--	1	No
SR2(B)	2291.1	-492.8	1365.2	--	--	Yes	--	--
REL	2290.6	-510.4	1349.6	270	24	--	1	No
SR3-1	2968.4	-487.4	1372.0	270	41	No	--	No
SR3-2	3197.7	-487.2	1376.9	270	38	No	--	No
Side Rail Right Side								
SR1	2229.1	488.2	1344.2	--	--	Yes	--	--
REL	2205.8	488.2	1338.2	50	42	--	--	No
SR2(A)	2379.0	495.3	1370.7	--	--	Yes	--	Yes
REL	2425.4	485.4	1357.8	50	45	--	2	No
SR2(B)	2293.0	494.9	1366.0	--	--	Yes	--	--
REL	2295.7	486.1	1339.0	90	44	--	2	No

SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
SR3-1	2965.1	487.3	1375.1	90	41	No	--	No
SR3-2	3199.0	484.0	1380.5	90	38	No	--	No
Rear Header Left Side								
RH	3907.5	-390.8	1387.0	Exempt from testing.				
Rear Header Right Side								
RH	3902.7	387.6	1389.3	Exempt from testing.				
Upper Roof Left Side								
UR1	2240.1	-396.4	1390.6	270	50	No	--	No
UR2	2593.1	-393.4	1414.1	270	38	No	--	No
UR3	3387.3	-397.8	1447.5	270	38	No	--	No
Upper Roof Right Side								
UR4	2242.6	398.2	1390.6	30	41	No	--	No
UR5	2595.0	390.8	1414.0	90	36	No	--	Yes
UR6	3396.5	396.3	1450.0	90	38	No	--	Yes

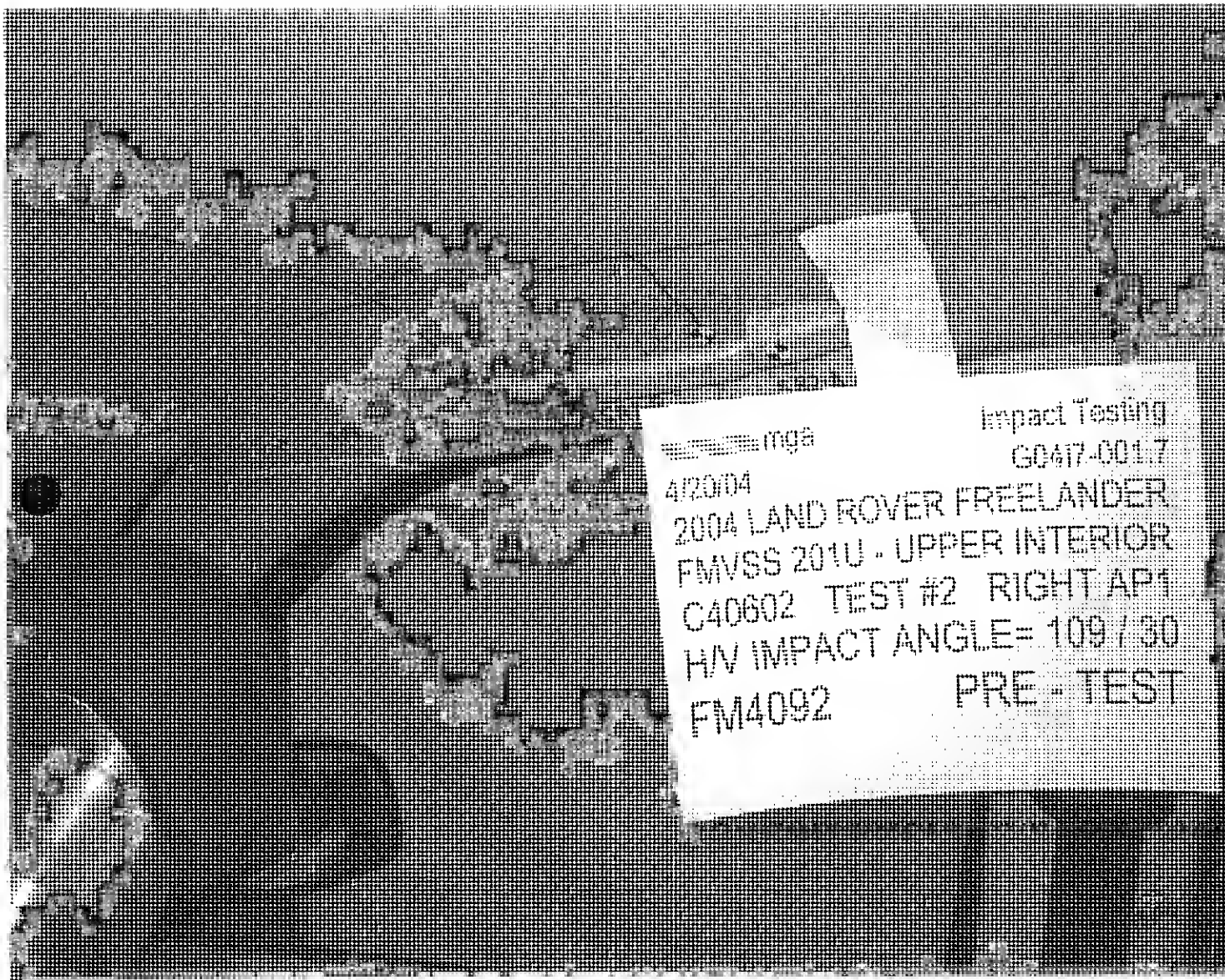
As determined using the Procedures specified in S10.1-10.13.

REMARKS: Targets RP1, RP2, and RH on both sides were determined to be located greater than 600 mm behind the rearmost SgRP. Therefore, these targets are exempt from testing.

RECORDED BY: David G. Gotwals

DATE: April 15, 2004

APPROVED BY: Helen A. Kaleto



4/20/04

2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST #2 RIGHT AP1
H/V IMPACT ANGLE= 109 / 30
FM4092

Impact Testing
G0417-001.7

PRE - TEST



4/20/04

Impact Testing

G0417-0017

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST #2 RIGHT AP1

HV IMPACT ANGLE= 109 / 30

FM4092

POST TEST

mgc

Impact Testing

4/20/04

G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST #2 RIGHT AP1

H/V IMPACT ANGLE= 109 / 30

FM4092

POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: 66437-001.7 VEHICLE YR/MAKE/MODEL: 2004/Land Rover/ Freelander

GENERAL TEST PARAMETERS:

Test Number: 2

Target (Vehicle Side): left/right API

Temperature: 25 °F/C

MGA Test Reference No.: Fm4092

Humidity: 25 %

Approach Angles: Horizontal 109 °

Time of Test: 12:00 am/pm

Vertical 30 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
831	280	5.1	24.0	10	5

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-91.8	6.196	1.20
Y	6	J35919	94.1	1.225	1.23
Z	7	J36382	84.3	1.438	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): _____

no visible damage

Recorded By: mm J. B. M. Approved By*: Helen G. Kalcto Date: 4-20-04

*Only necessary for NHTSA (Government) Compliance testing.

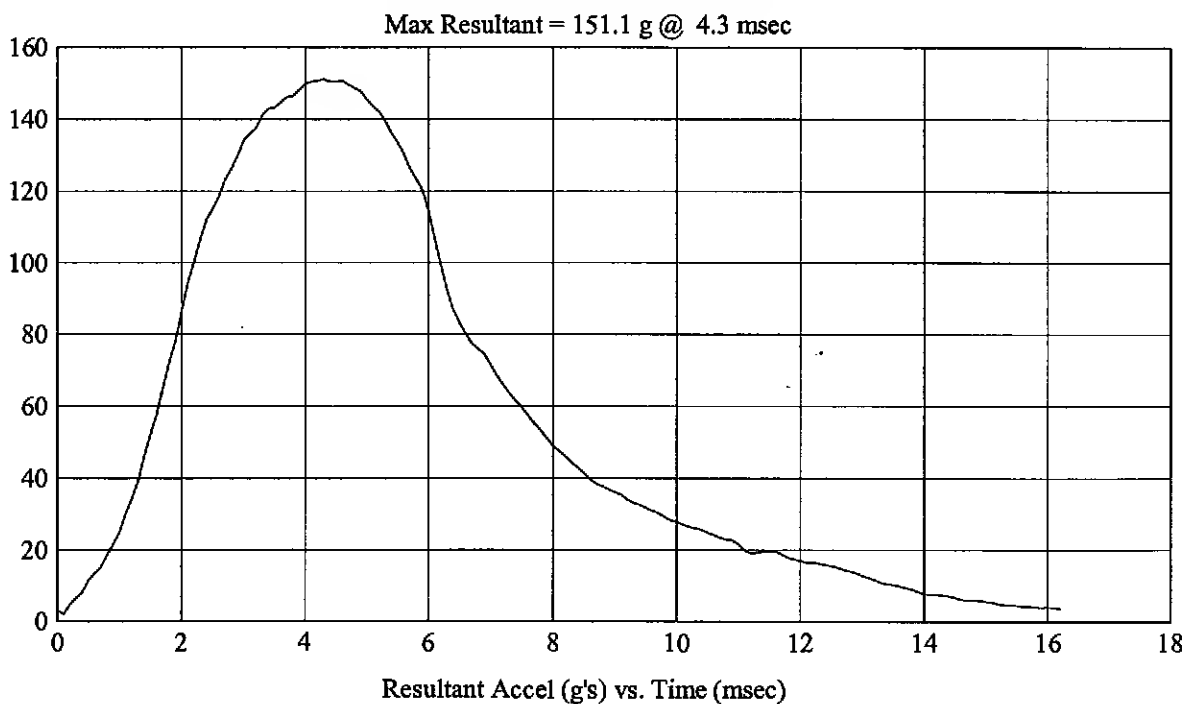
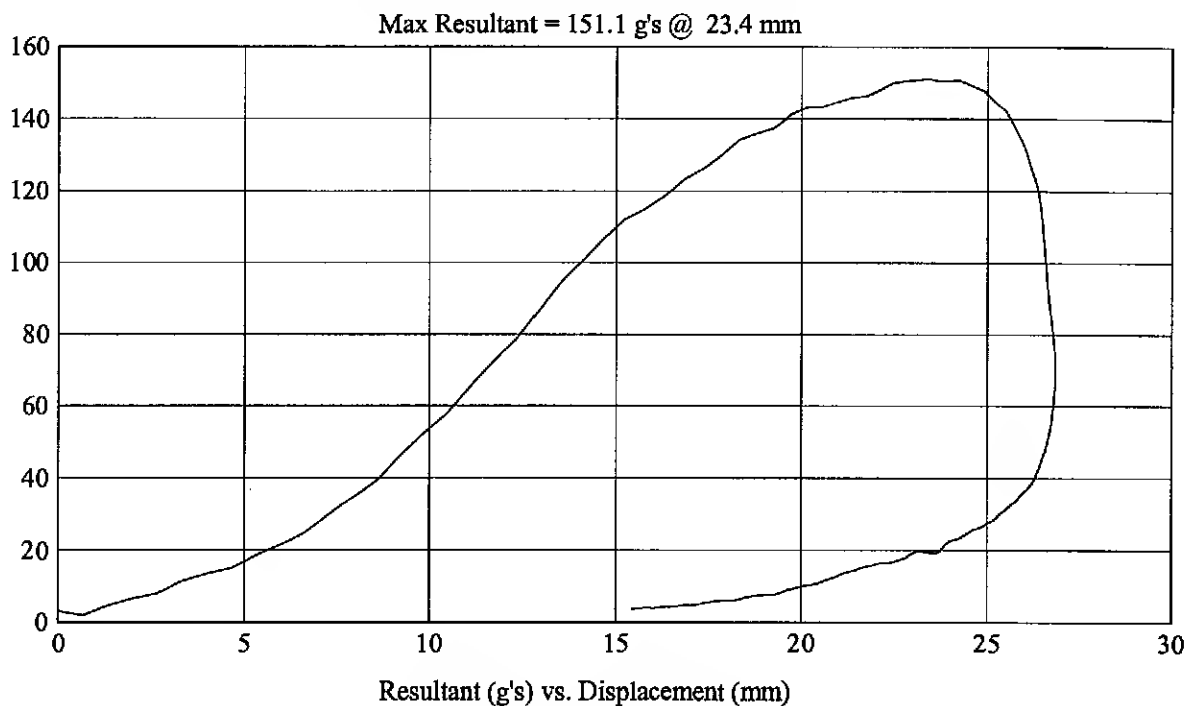
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 2
FM4092
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 109/30

HIC(d) = 831, HIC = 880, Delta T = 5.1 msec

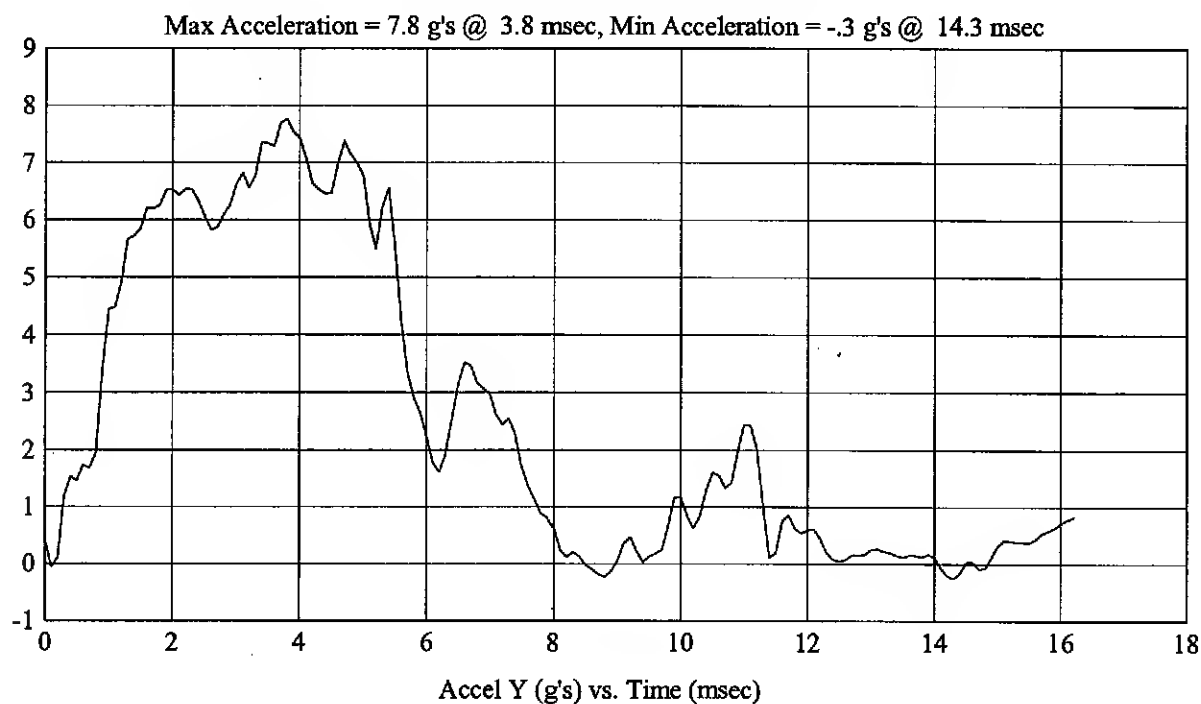
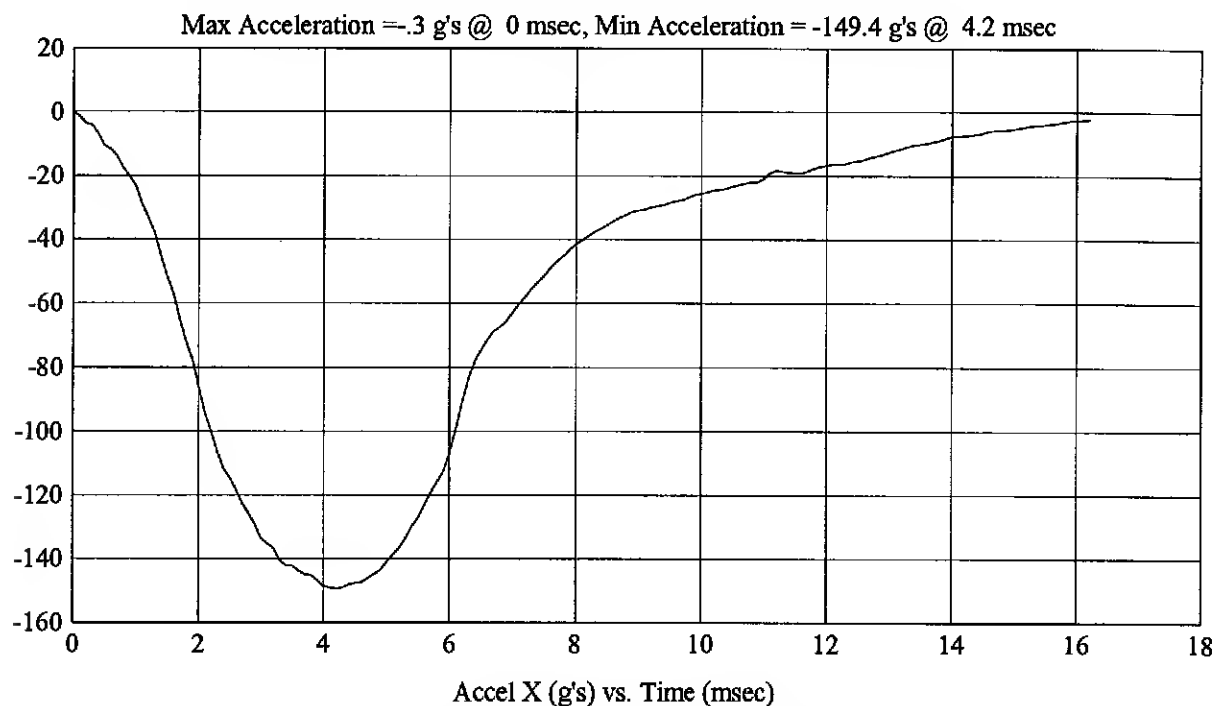


FMH
G04I7-001.7Customer: LAND ROVER
Test # 2
FM4092
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 109/30

HIC(d) = 831, HIC = 880, Delta T = 5.1 msec



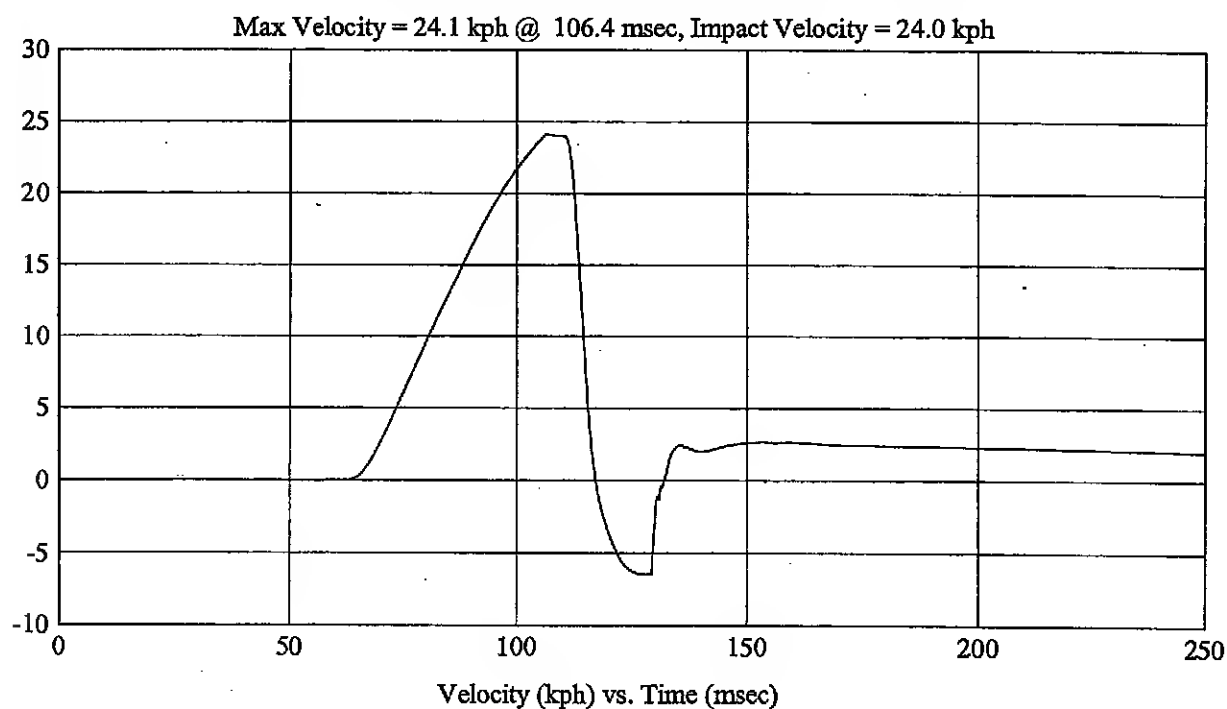
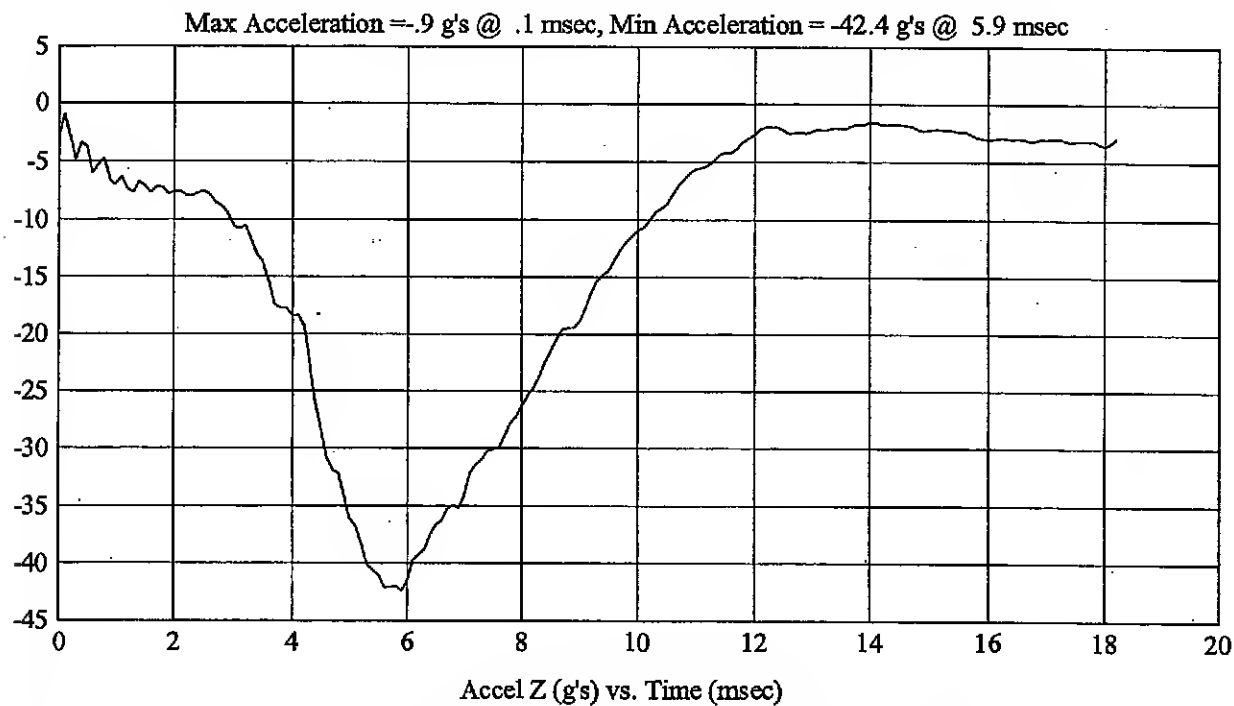
FMH
G04I7-001.7Customer: LAND ROVER
Test # 2
FM4092
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/20/04

Model Year: 2004
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 109/30

HIC(d) = 831, HIC = 880, Delta T = 5.1 msec



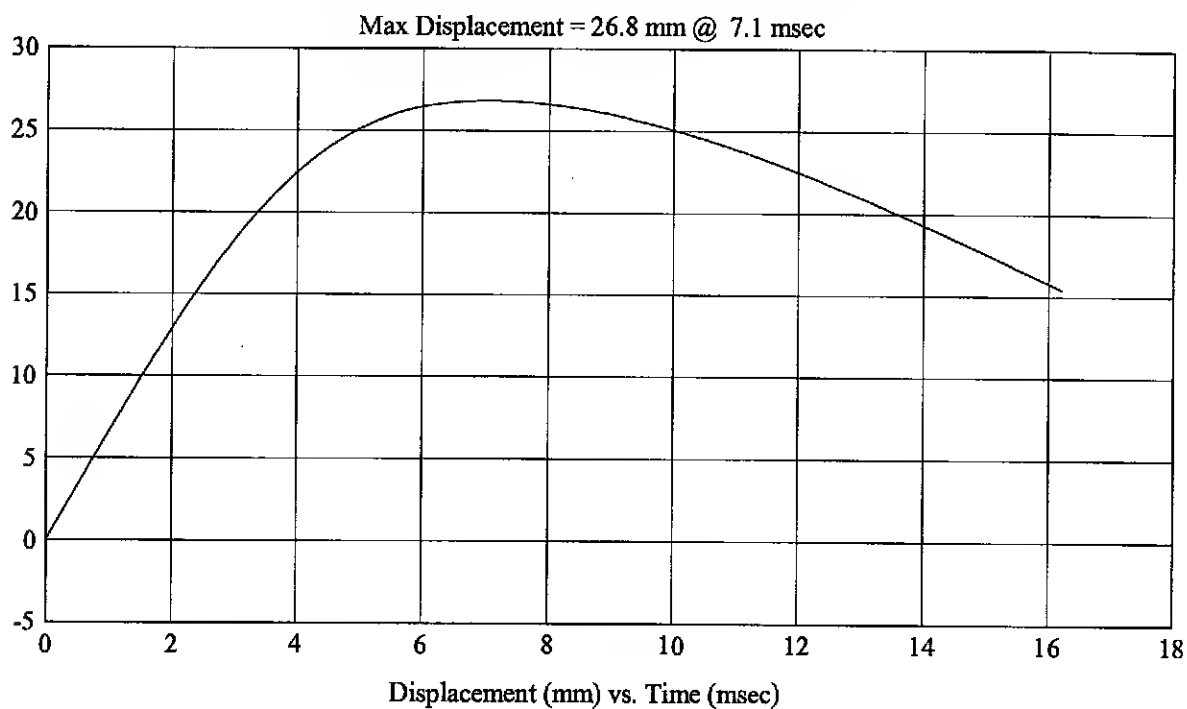
FMH
G04I7-001.7

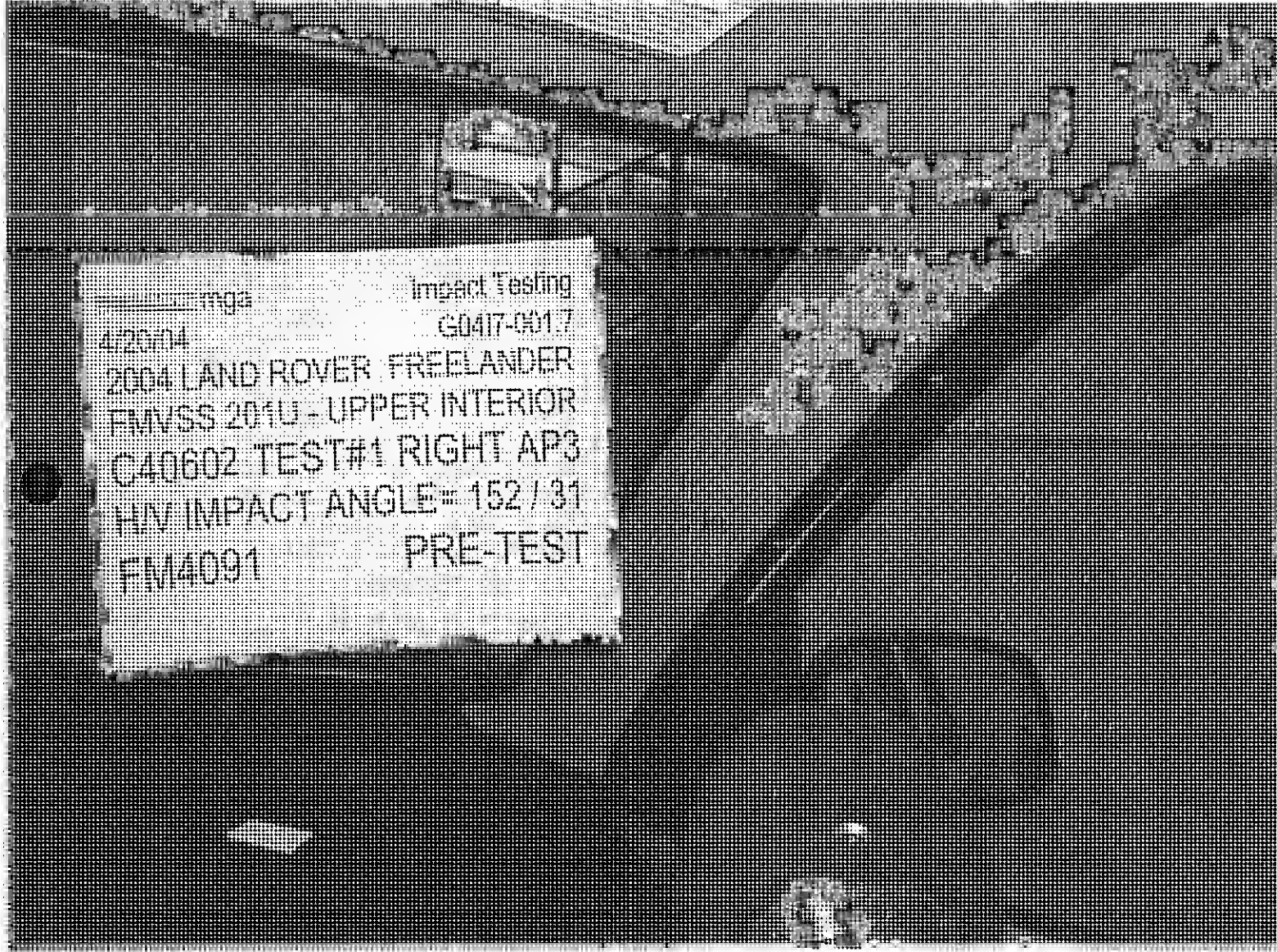
Customer: LAND ROVER
Test # 2
FM4092
Additional Desc: N/A

Vehicle Program : FREELANDER

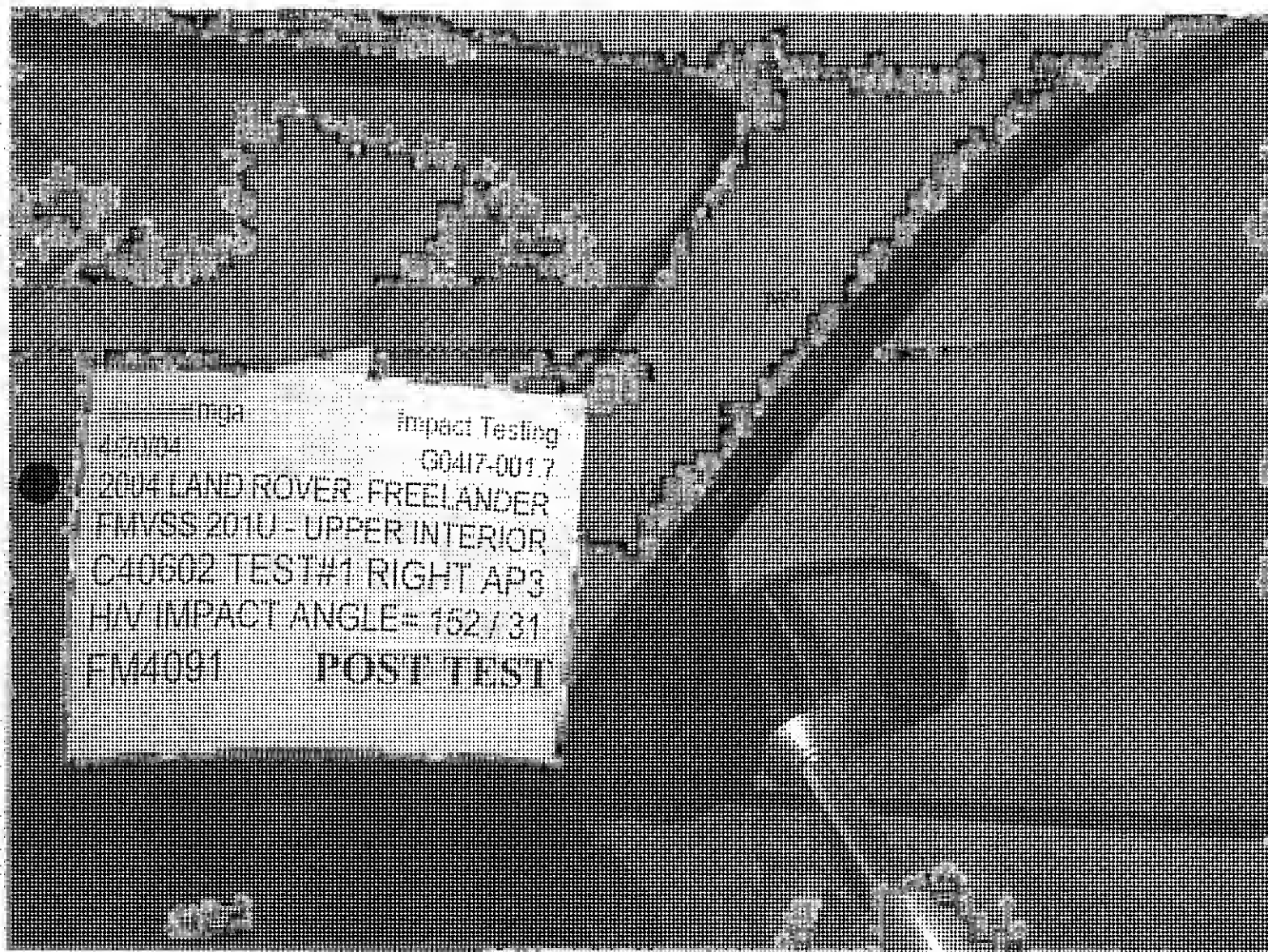
Model Year: 2004
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 109/30

HIC(d) = 831, HIC = 880, Delta T = 5.1 msec





4/20/04 Impact Testing
G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST#1 RIGHT AP3
HV IMPACT ANGLE = 152 / 31
FM4091 PRE-TEST



=====mga

Impact Testing

4/20/04

G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST#1 RIGHT AP3

H/V IMPACT ANGLE= 152 / 31

FM4091

POST TEST

=====mga

4/20/04

Impact Testing

G04/7-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST#1 RIGHT AP3

H/V IMPACT ANGLE= 152 / 31

FM4091

POST TEST

=====mga

Impact Testing

4/20/04

G0417-001.7

2004 LAND ROVER FREELANDER

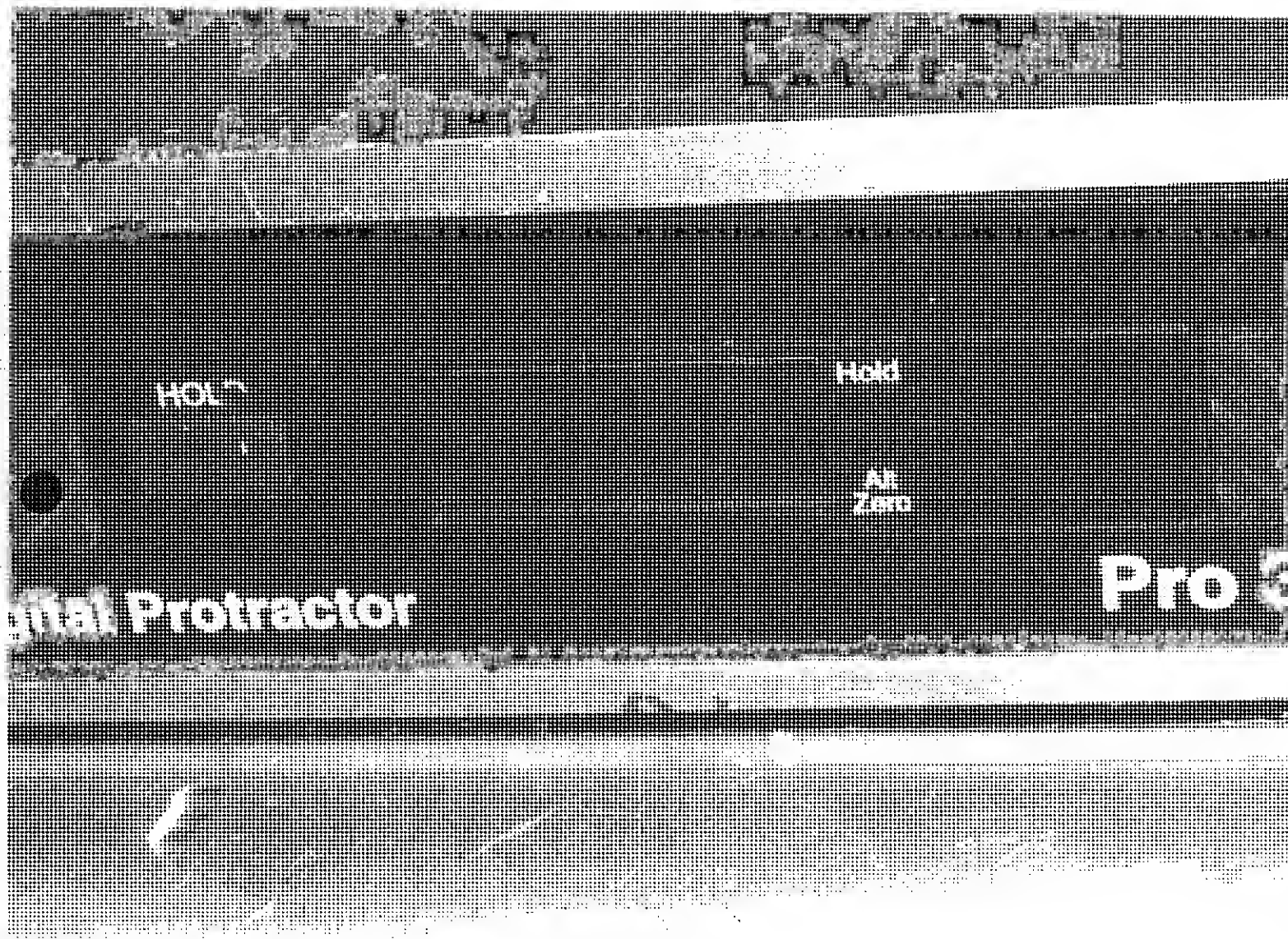
FMVSS 201U - UPPER INTERIOR

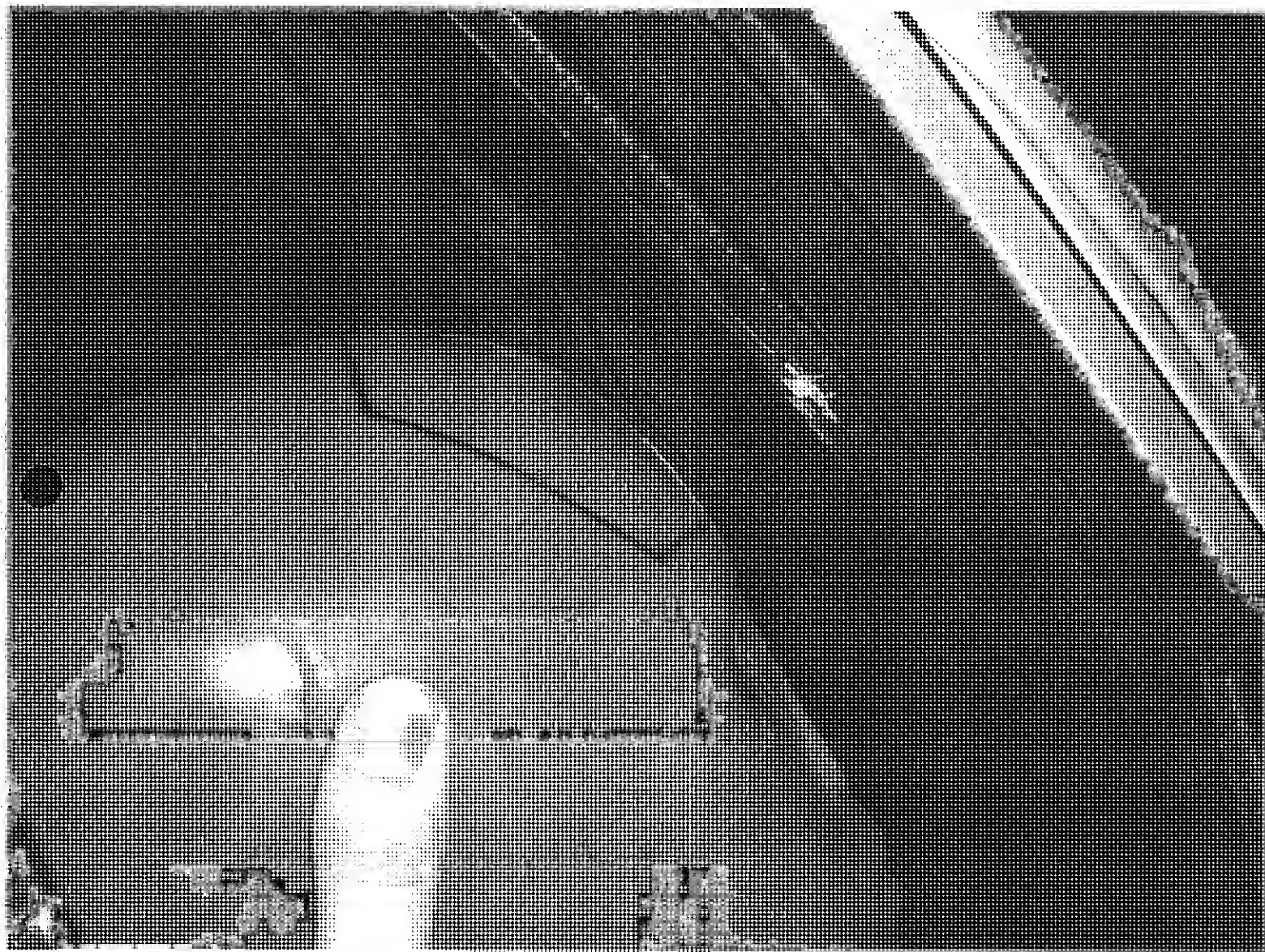
C40602 TEST#1 RIGHT AP3

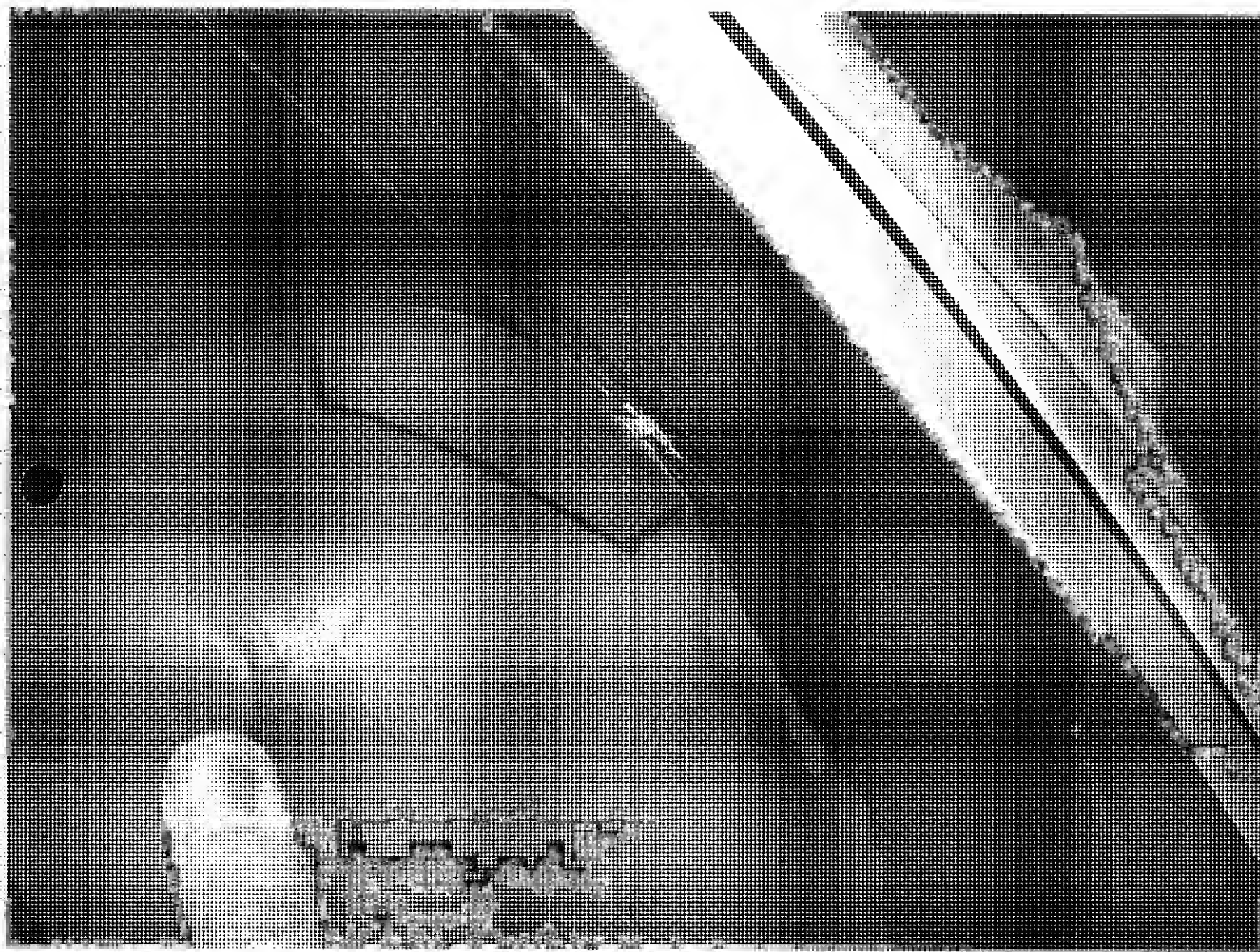
H/V IMPACT ANGLE= 152 / 31

FM4091

POST TEST







MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40602 VEHICLE YR/MAKE/MODEL: 2004 LAMBO ROVER FREEMAN

GENERAL TEST PARAMETERS:

Test Number: 1

Target (Vehicle Side): left/right AP3

Temperature: 24 °F/°C

MGA Test Reference No.: Fm4091

Humidity: 24 %

Approach Angles: Horizontal 152 °

Time of Test: 10:10 am/pm

Vertical 31 °

FMH Serial No: 38

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1062	1187	4.5	23.9	15	14

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-107.3	1.20	1.20
Y	6	J36193	101.1	1.23	1.23
Z	7	J36353	97.1	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

NO VISIBLE DAMAGE

APPROXIMATE TEST FAILURE

Recorded By: [Signature]

Approved By*: [Signature]

Date: 4/20/04

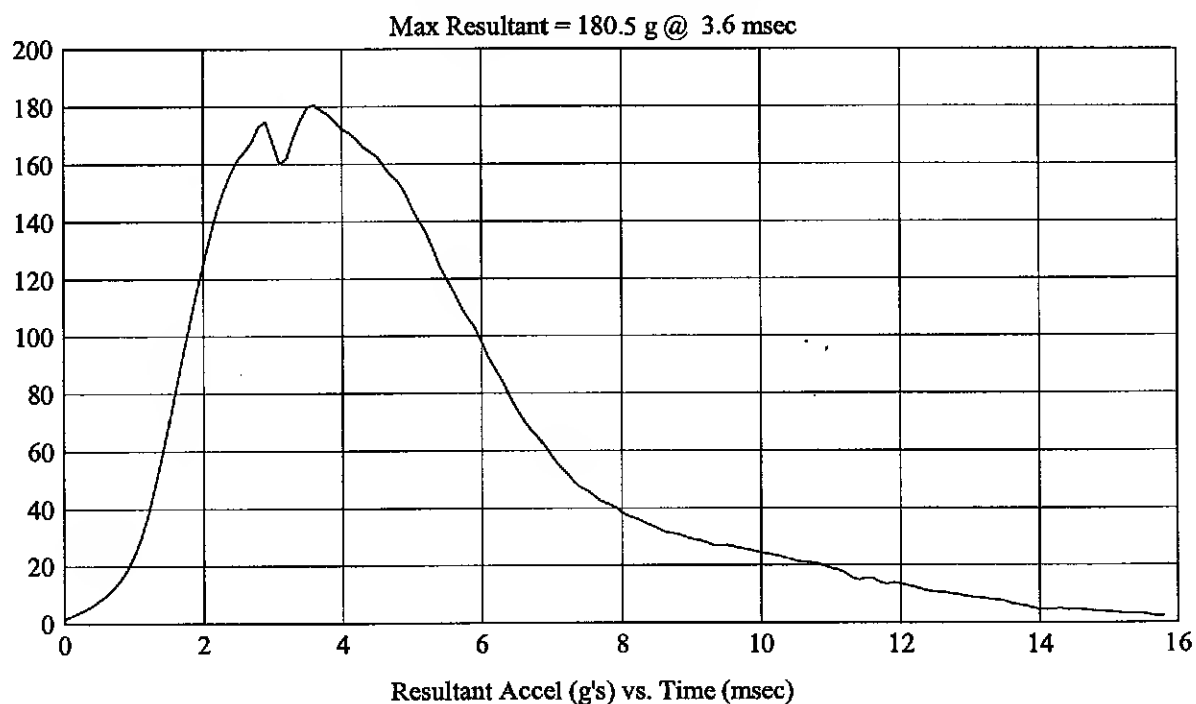
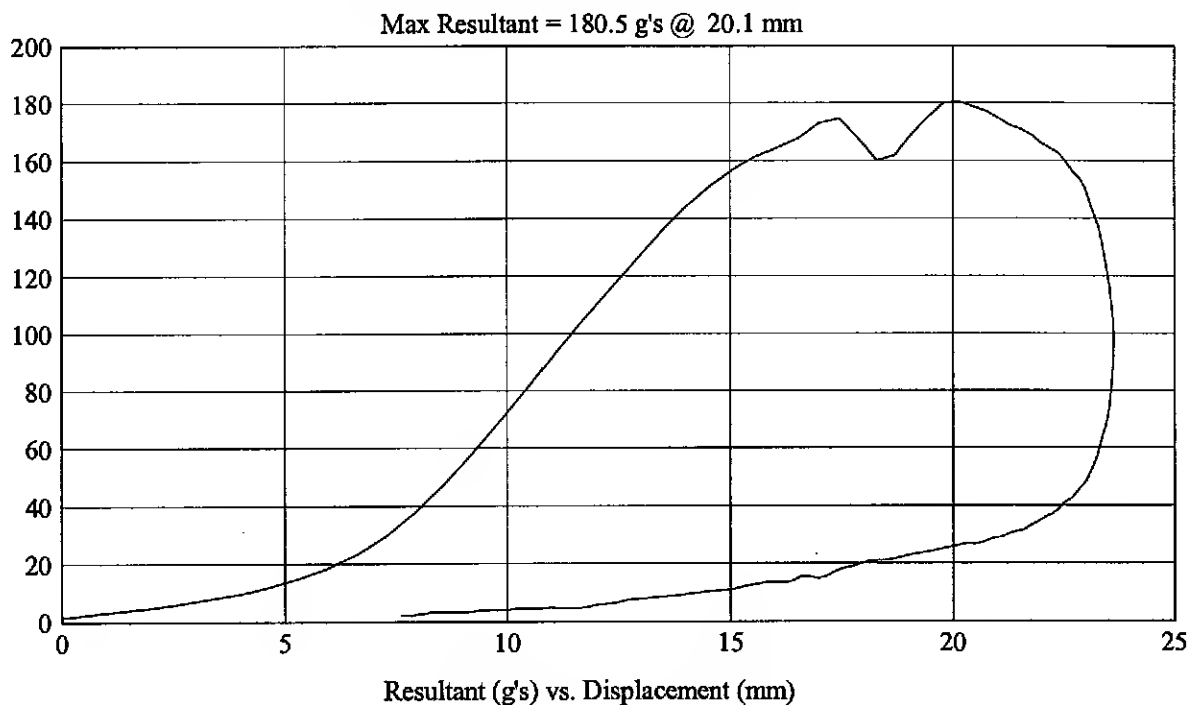
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 1
FM4091
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 152/31

HIC(d) = 1062, HIC = 1187, Delta T = 4.5 msec

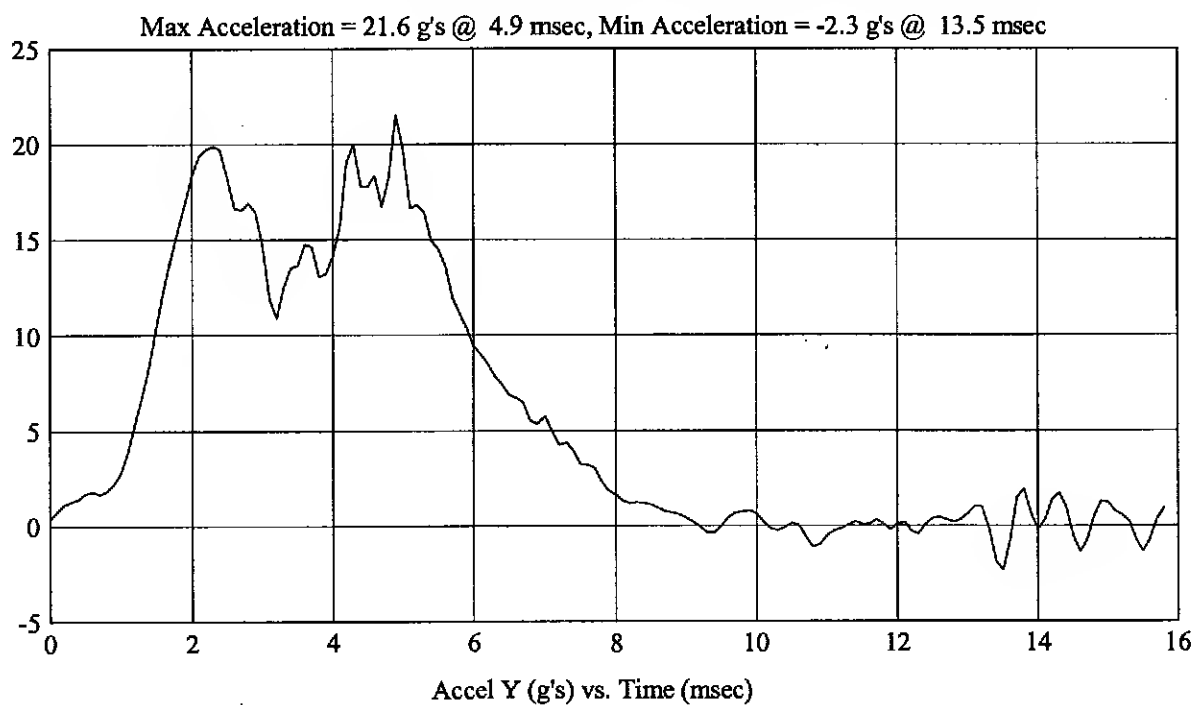
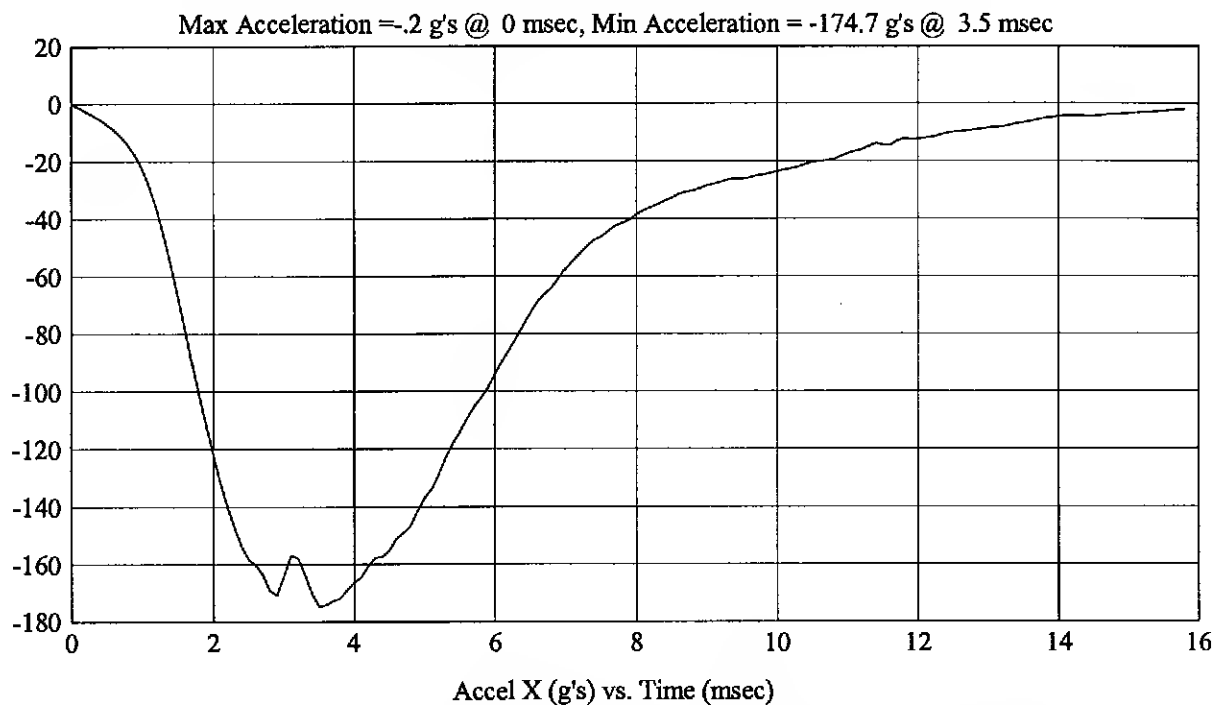


FMH
G04I7-001.7Customer: LAND ROVER
Test # 1
FM4091
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 152/31

HIC(d) = 1062, HIC = 1187, Delta T = 4.5 msec



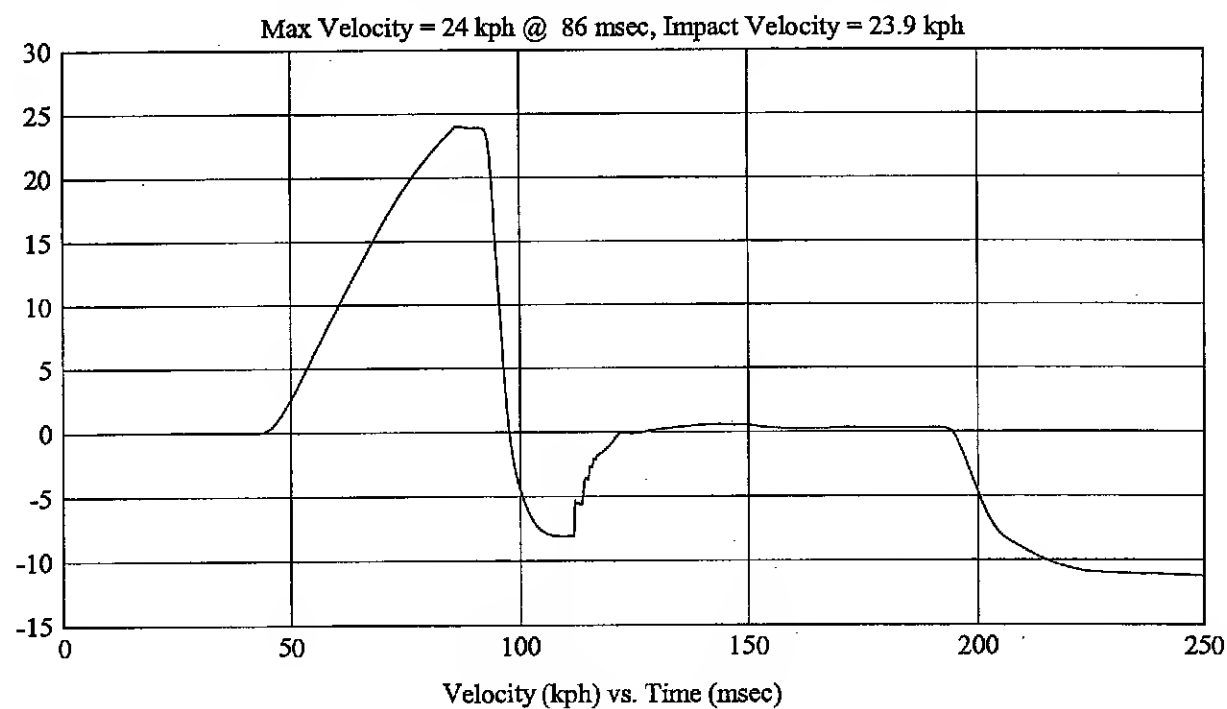
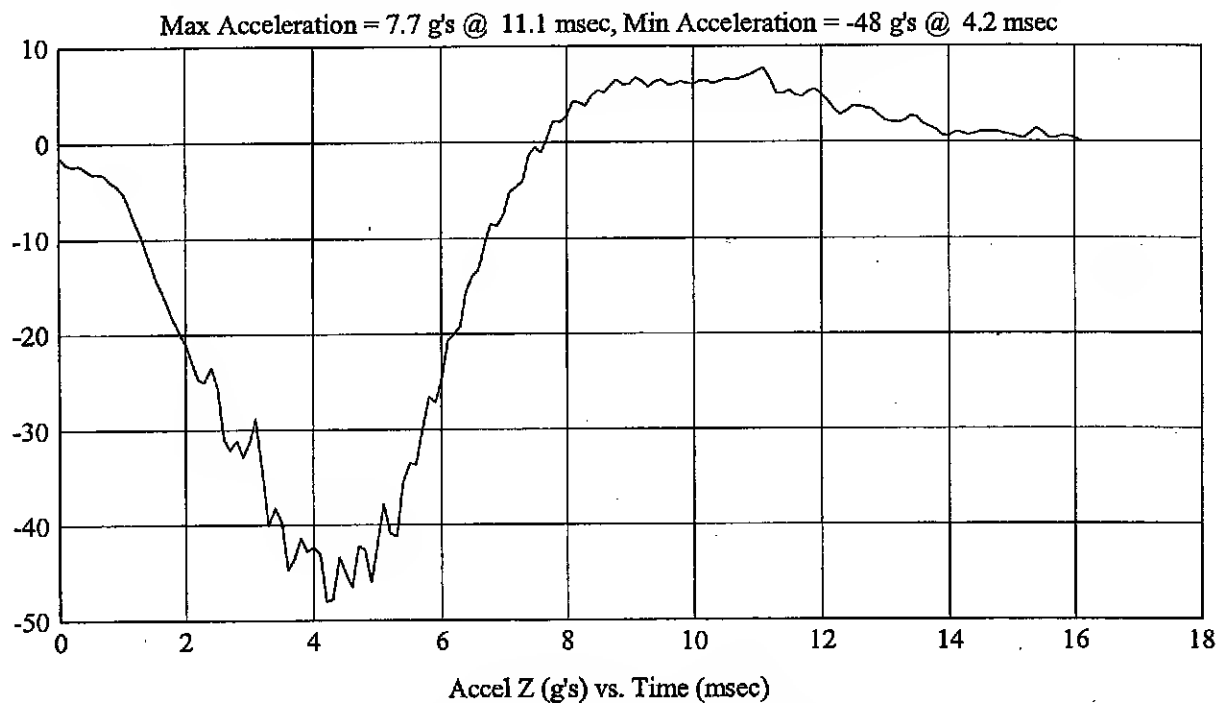
FMH
G04I7-001.7Customer: LAND ROVER
Test # 1
FM4091
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/20/04

Model Year: 2004
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 152/31

HIC(d) = 1062, HIC = 1188, Delta T = 4.5 msec



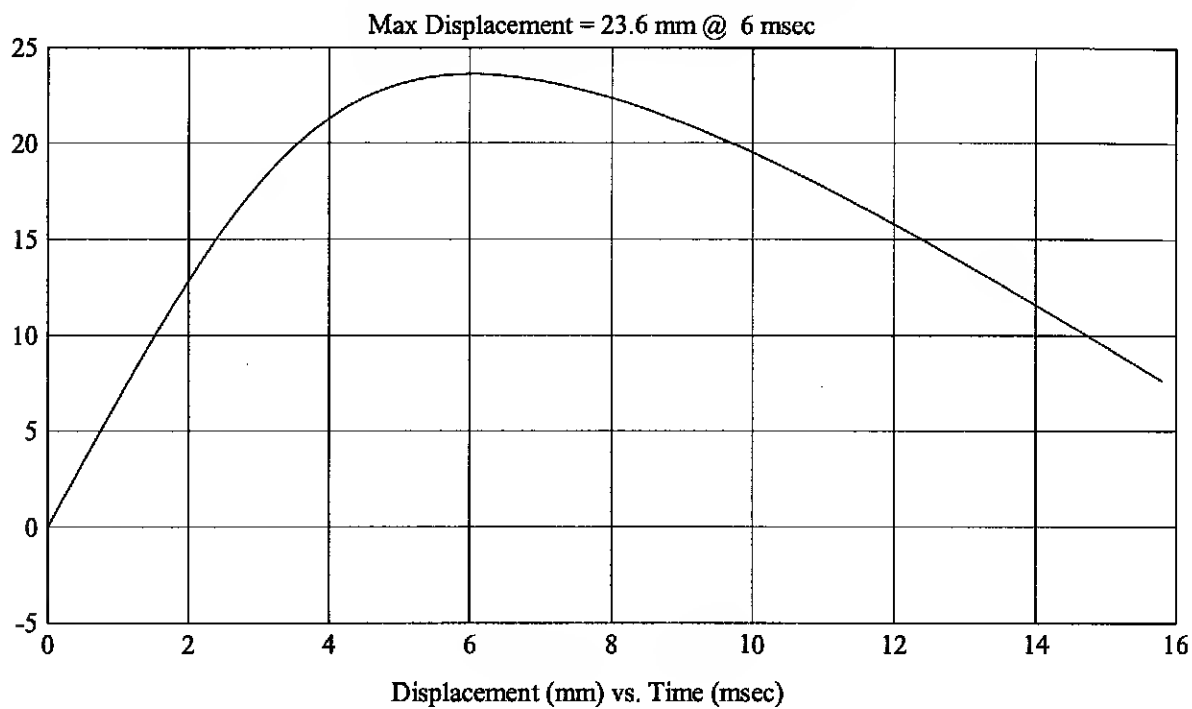
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 1
FM4091
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 152/31

HIC(d) = 1062, HIC = 1187, Delta T = 4.5 msec



===== mca

Impact Testing

4/21/04

G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40002 TEST #9 LEFT BP1

H/V IMPACT ANGLE= 270 / 10

FM4099

PRE-TEST

mga

Impact Testing

02/04

G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40302 TEST #9 LEFT BP1

HV IMPACT ANGLE= 270 / 10

FM4099

POST-TEST

Impact Testing
4/21/04 G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 2010U - UPPER INTERIOR
C40602 TEST #9 LEFT BP1
HV IMPACT ANGLE= 270 / 10
FM4099 POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40602 VEHICLE YR/MAKE/MODEL: 2004 LAND ROVER FREELANDER

GENERAL TEST PARAMETERS:

Test Number: 9

Target (Vehicle Side) (C) Left BPI

Temperature: 28 °F (C)

MGA Test Reference No.: FM4099

Humidity: 42 %

Approach Angles: Horizontal 270 °

Time of Test: 1:30 am/pm (pm)

Vertical 10 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	<u>(C) Left</u> Right Pt. O
676	675	6.2	23.9	50	11

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-102.3	1.20	1.20
Y	6	J35916	99.3	1.23	1.23
Z	7	J35918	98.7	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

B-PILLOW TRIM WAS COMPRESSED INTO THE SIDE REAR

Recorded By: [Signature]

Approved By: Heleen A. Kalato Date: 4/21/04

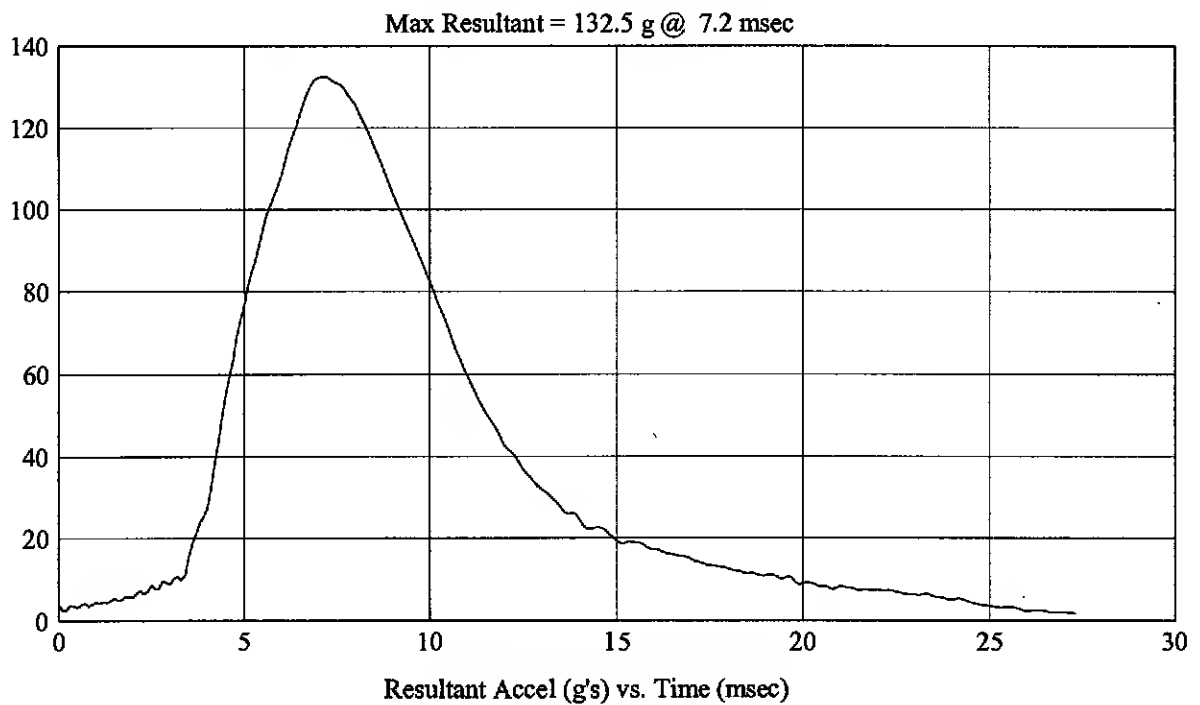
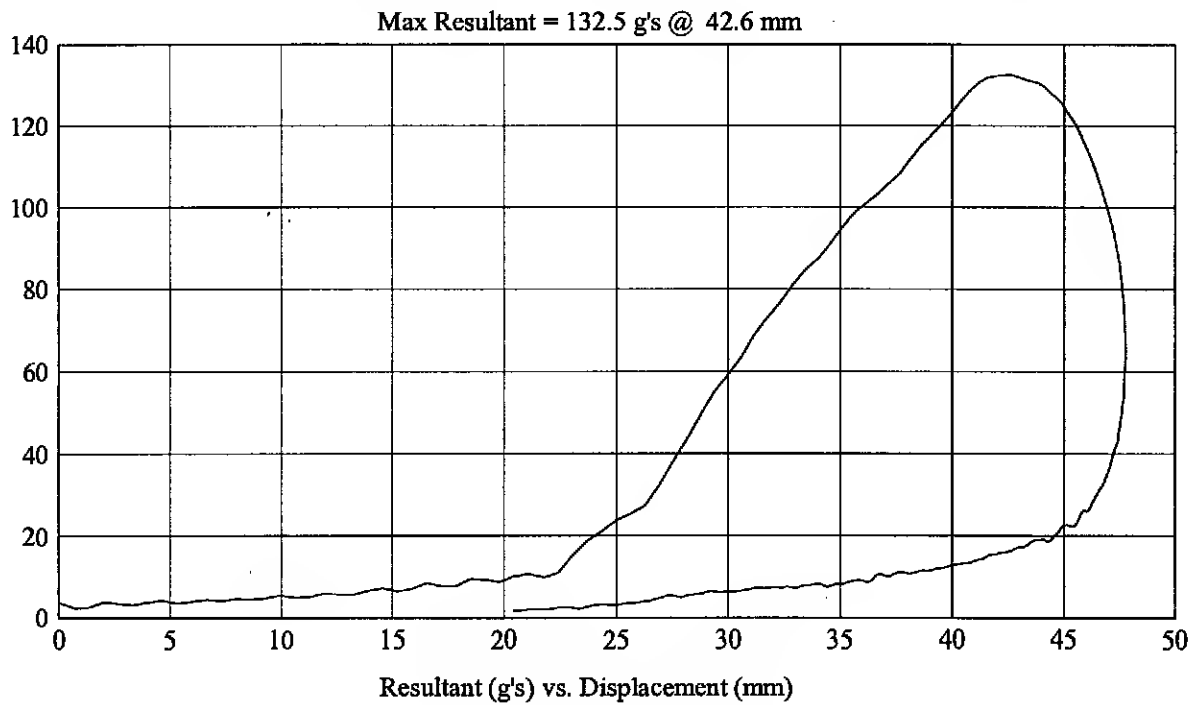
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 9
FM4099
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP1
Vehicle Side: Left
Horz/Vert Angle: 270/10

HIC(d) = 676, HIC = 675, Delta T = 6.2 msec

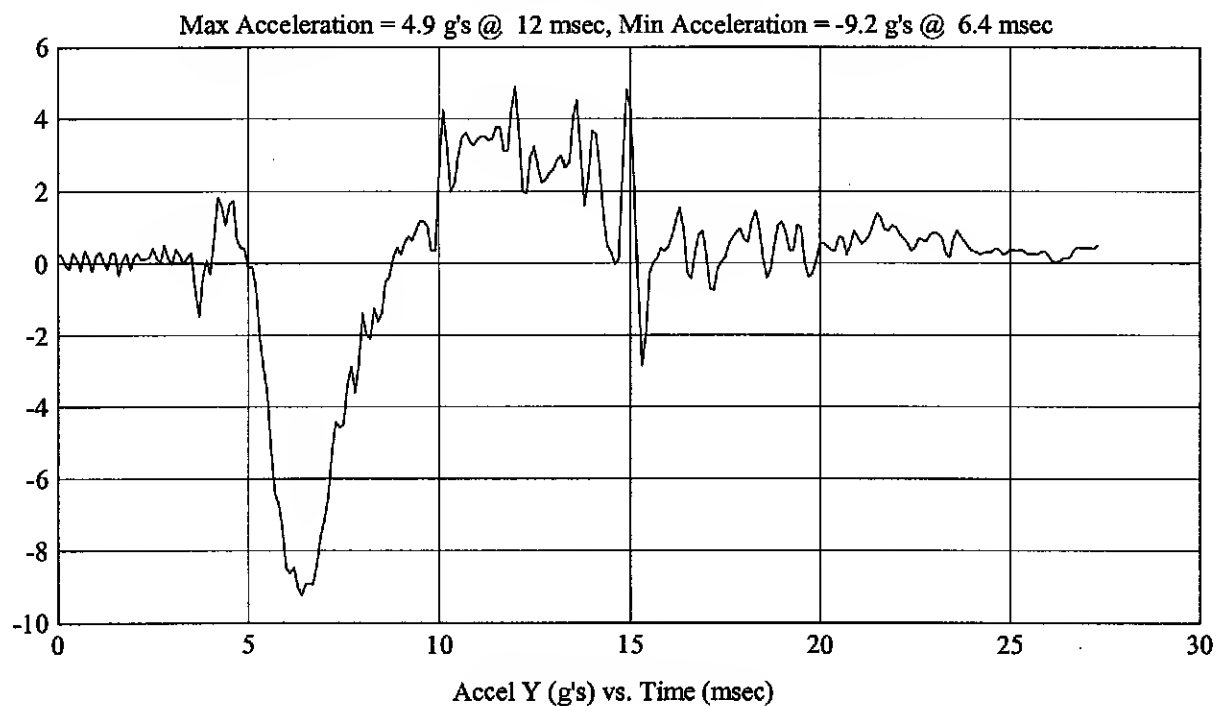
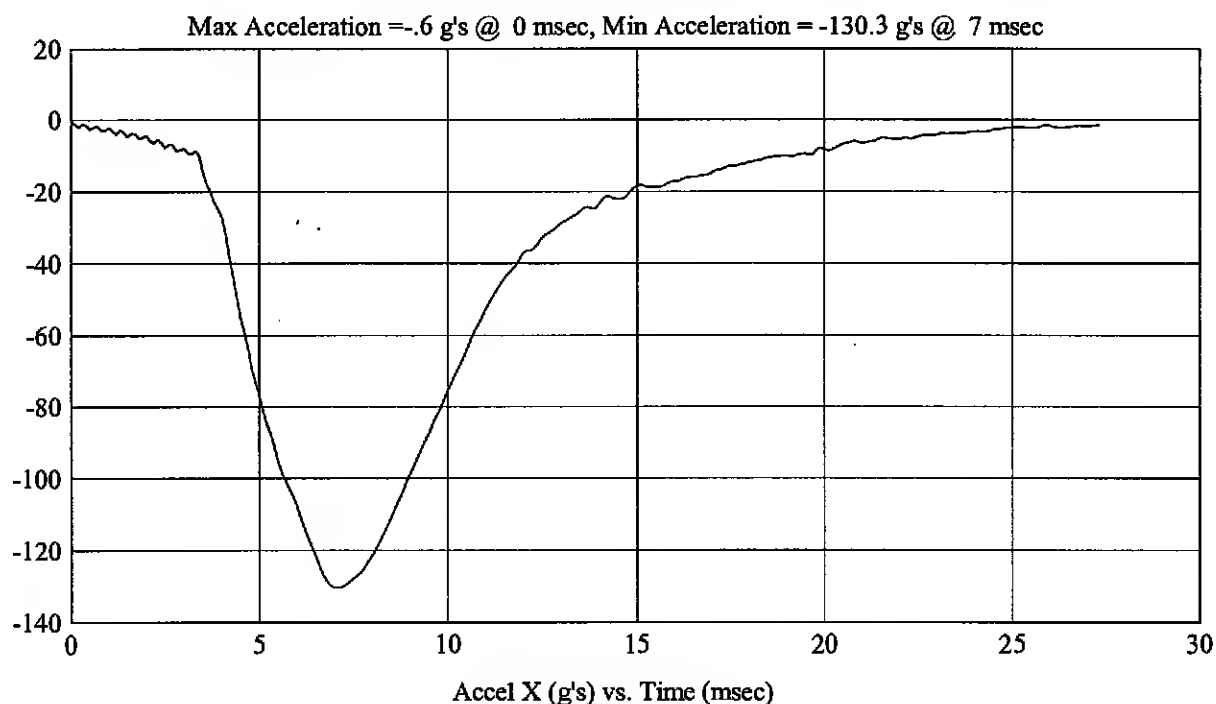


FMH
G04I7-001.7Customer: LAND ROVER
Test # 9
FM4099
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP1
Vehicle Side: Left
Horz/Vert Angle: 270/10

HIC(d) = 676, HIC = 675, Delta T = 6.2 msec



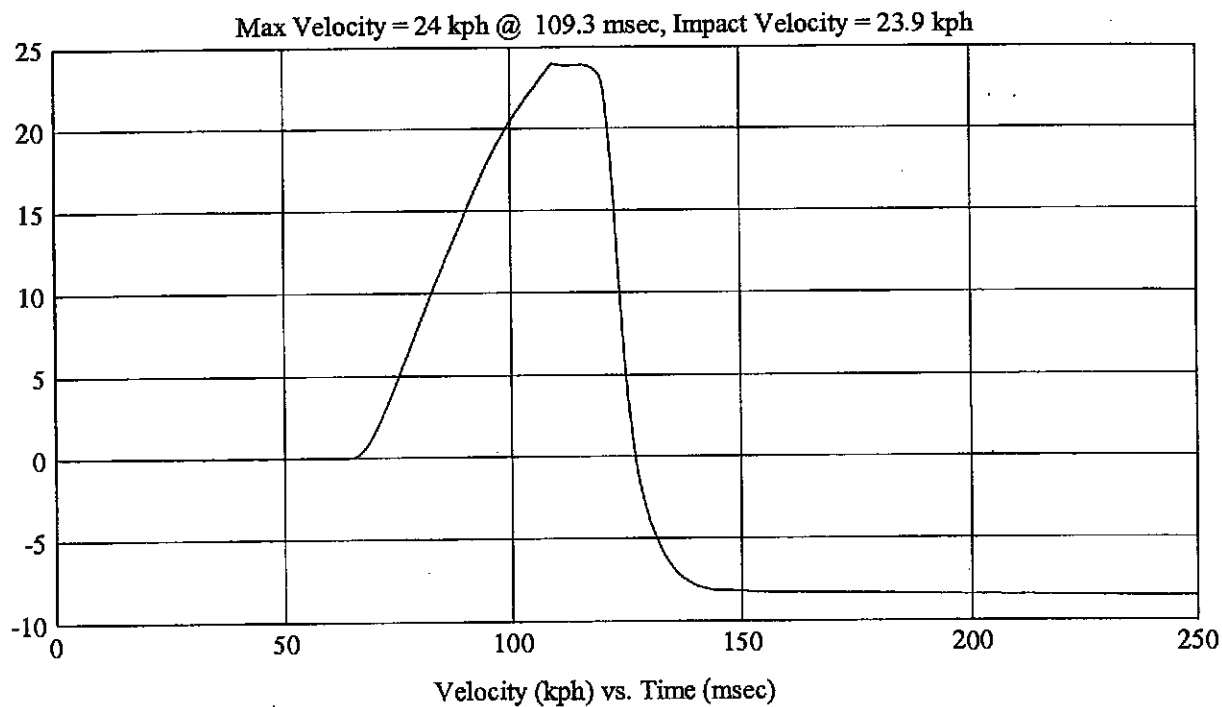
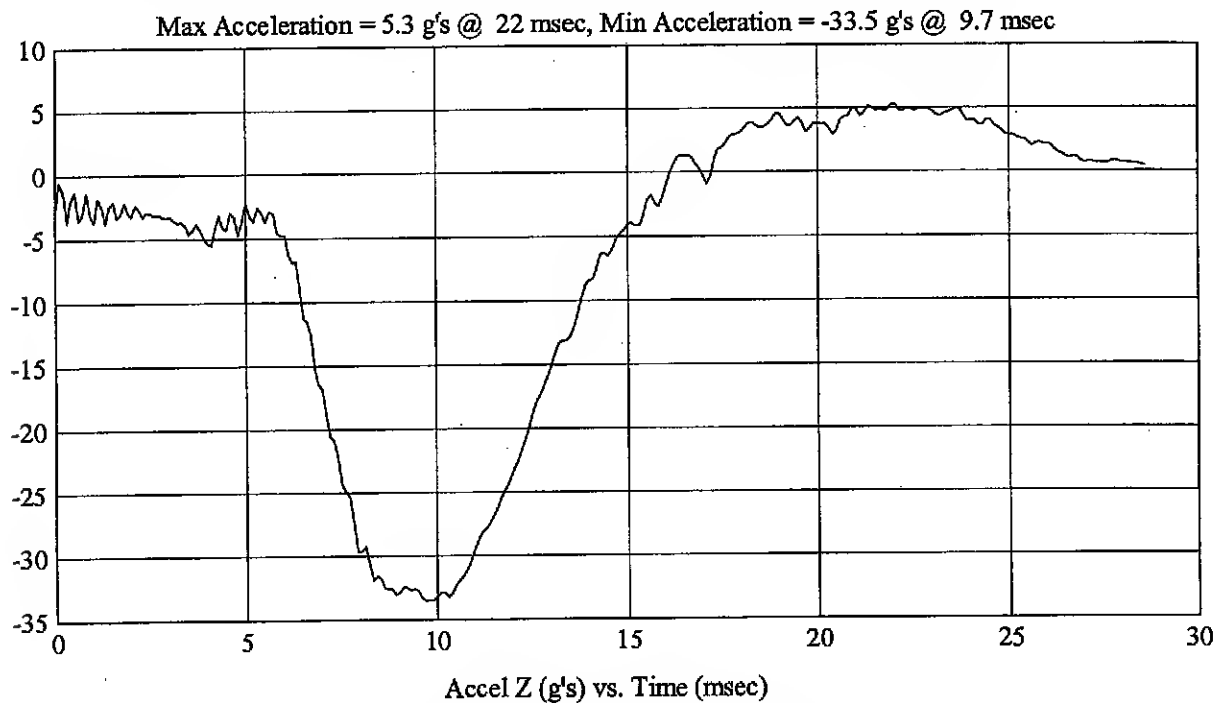
FMH
G04I7-001.7Customer: LAND ROVER
Test # 9
FM4099
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/21/04

Model Year: 2004
Target: BP1
Vehicle Side: Left
Horz/Vert Angle: 270/10

HIC(d) = 676, HIC = 675, Delta T = 6.2 msec



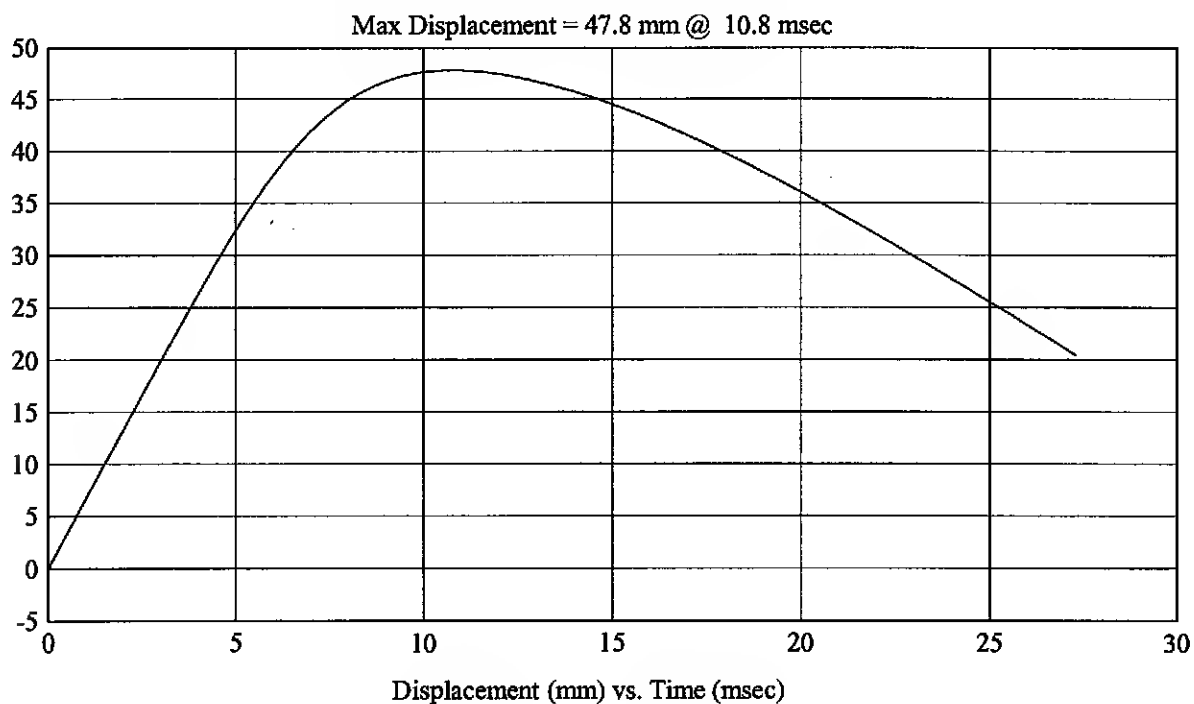
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 9
FM4099
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP1
Vehicle Side: Left
Horz/Vert Angle: 270/10

HIC(d) = 676, HIC = 675, Delta T = 6.2 msec



===== mga Impact Testing
4/20/04 G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST #4 RIGHT BP2
H/V IMPACT ANGLE= 90 / 3
FM4094 PRE - TEST

MGR

Impact Testing

4/20/04

G0417-0017

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST #4 RIGHT BP2

H/V IMPACT ANGLE= 90/3

FM4094 POST TEST

Impact Testing
4/20/04 G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
40602 TEST #4 RIGHT BP2
H/V IMPACT ANGLE= 90 / 3
FM4094 POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: 60427-001.7 VEHICLE YR/MAKE/MODEL: 2004 / Land Rover / Freelander

GENERAL TEST PARAMETERS:

Test Number: 4

Target (Vehicle Side): left/right left BPA

Temperature: 24 °F/°C

MGA Test Reference No.: FM4094

Humidity: 31 %

Approach Angles: Horizontal 90 °

Time of Test: 3:00 am/pm pm

Vertical 3 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
714	725	5.4	23.9	7	8

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-91.8	1.20	1.20
Y	6	J35919	94.1	1.23	1.23
Z	7	J36382	84.3	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

SEAT BELT ANCHORAGE COVER WAS CRACKED DURING IMPACT

Recorded By: [Signature]

Approved By*: [Signature]

Date: 4/20/04

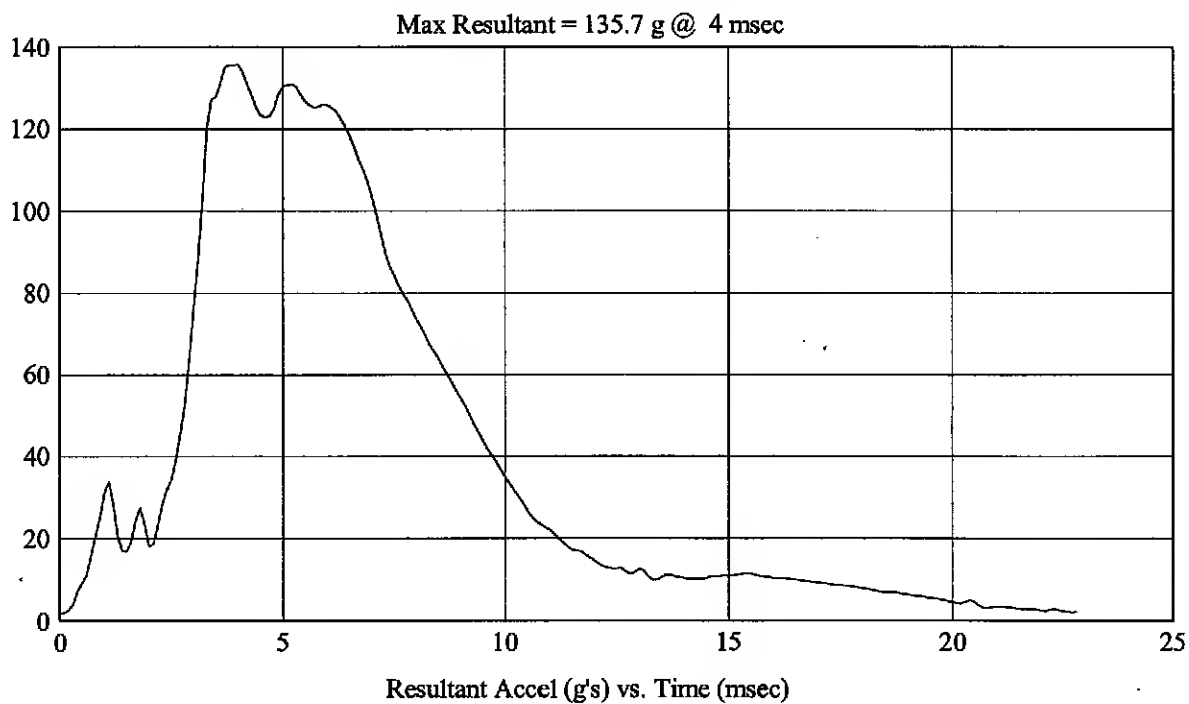
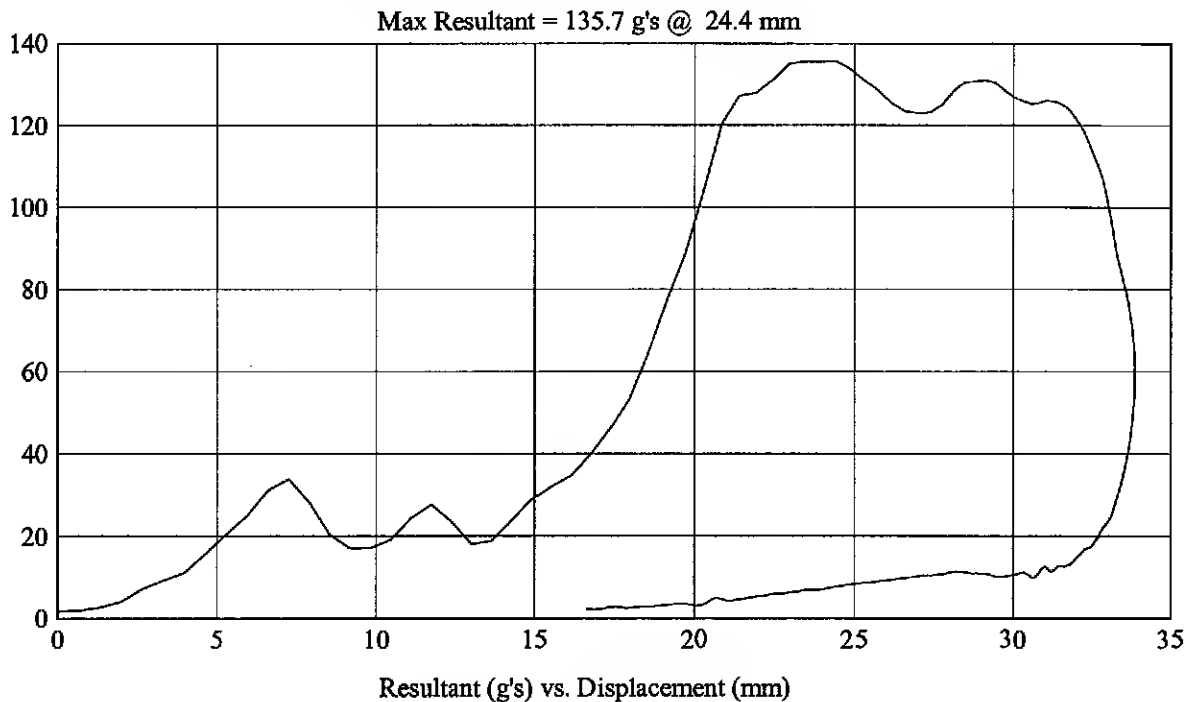
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 4
FM4094
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/3

HIC(d) = 714, HIC = 725, Delta T = 5.4 msec

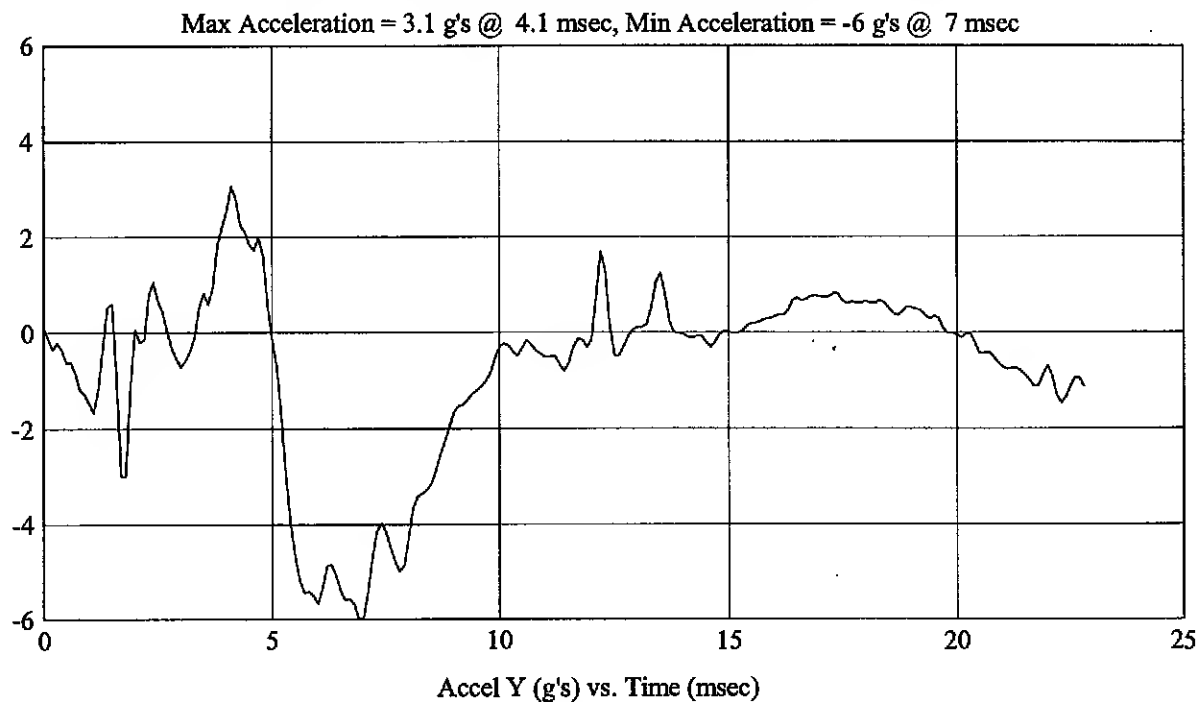
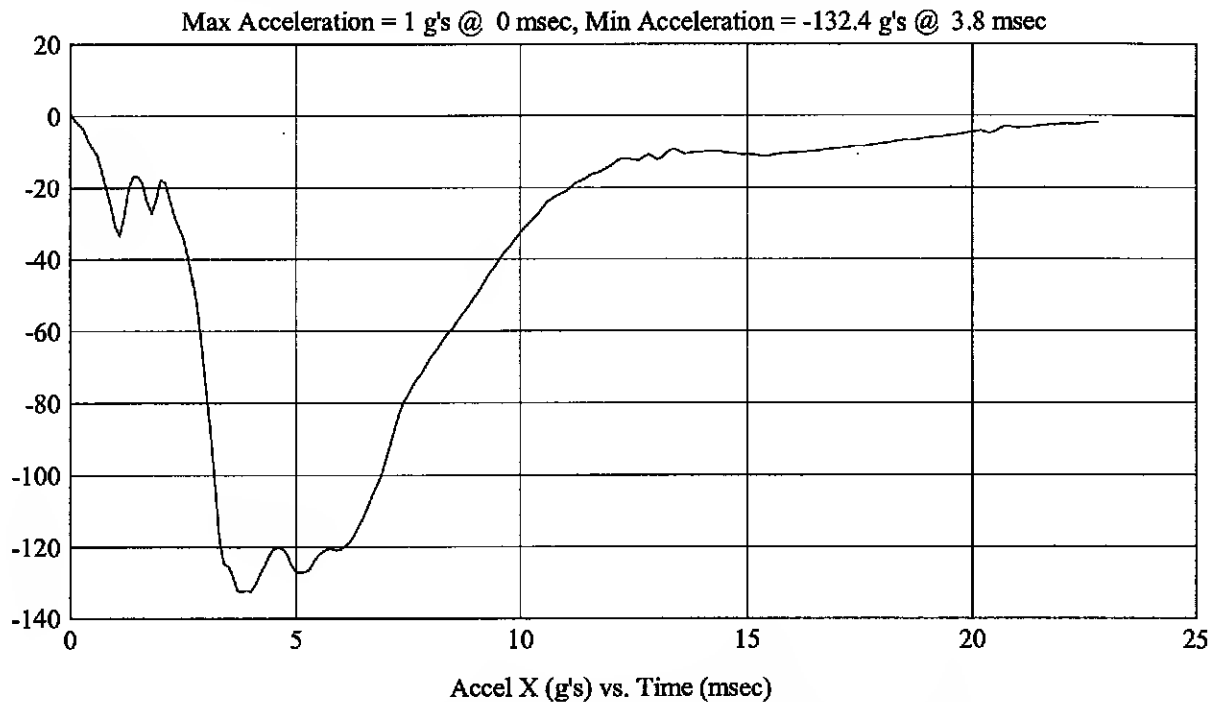


FMH
G04I7-001.7Customer: LAND ROVER
Test # 4
FM4094
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/3

HIC(d) = 714, HIC = 725, Delta T = 5.4 msec



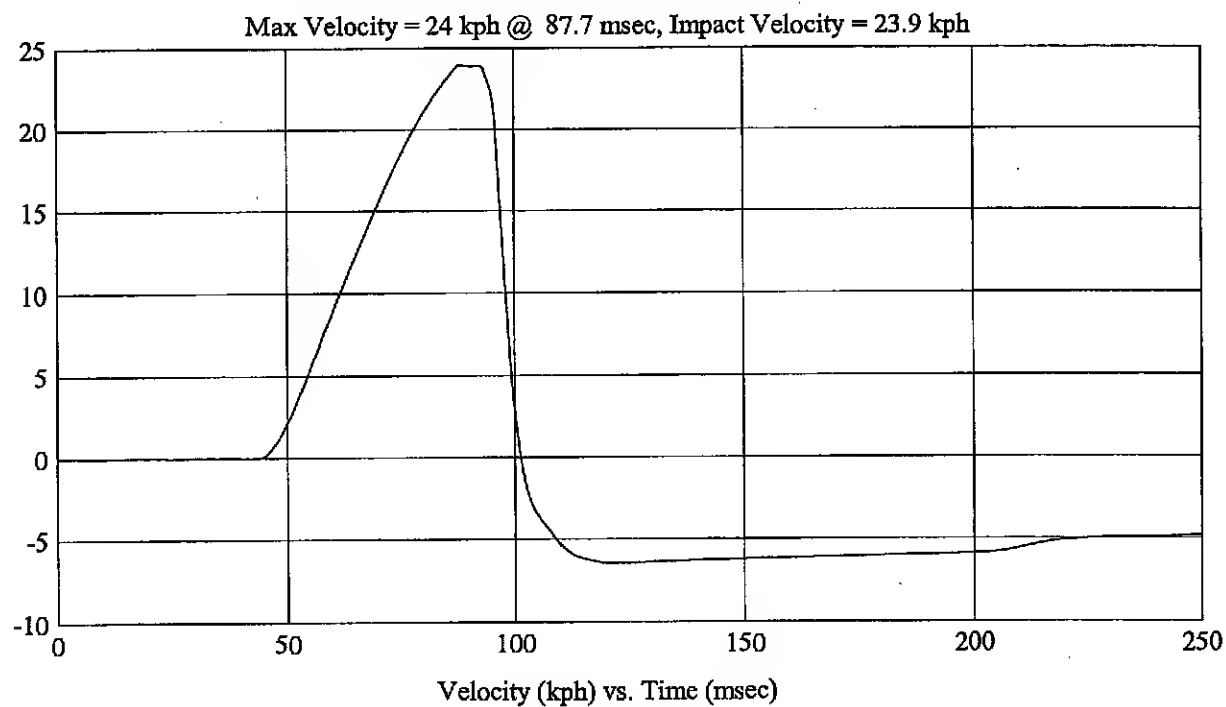
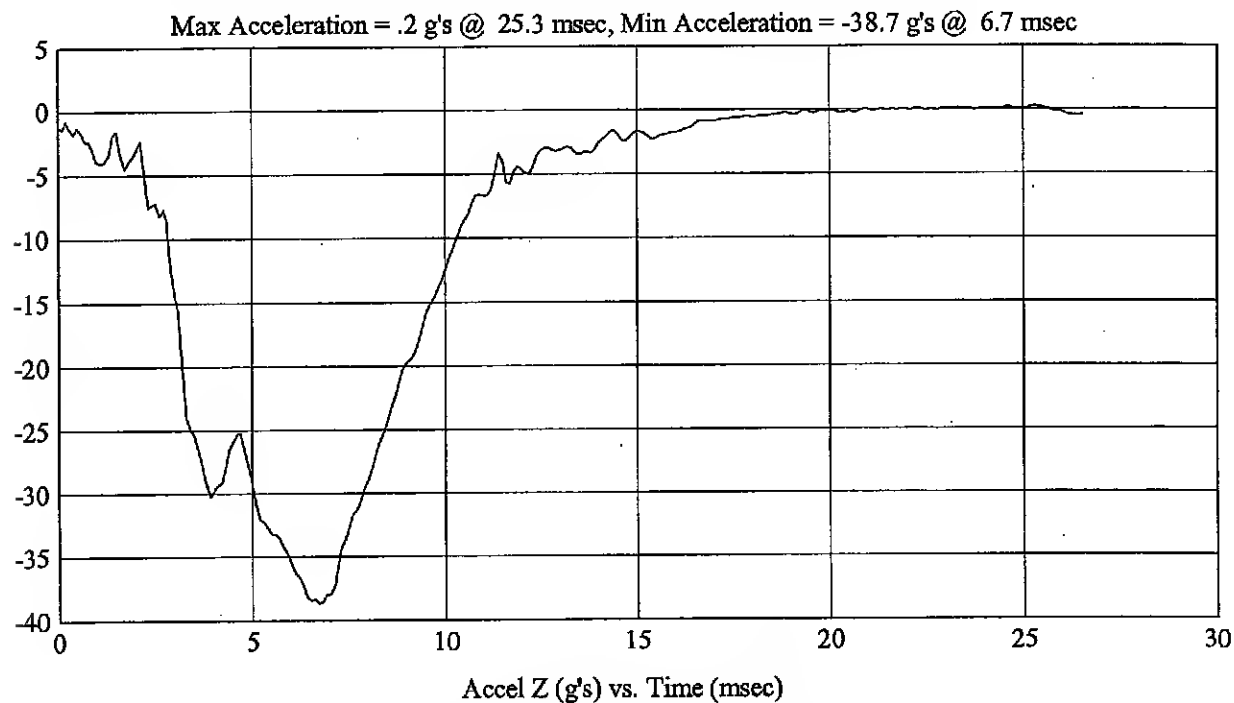
FMH
G04I7-001.7Customer: LAND ROVER
Test # 4
FM4094
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/20/04

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/3

HIC(d) = 714, HIC = 725, Delta T = 5.4 msec



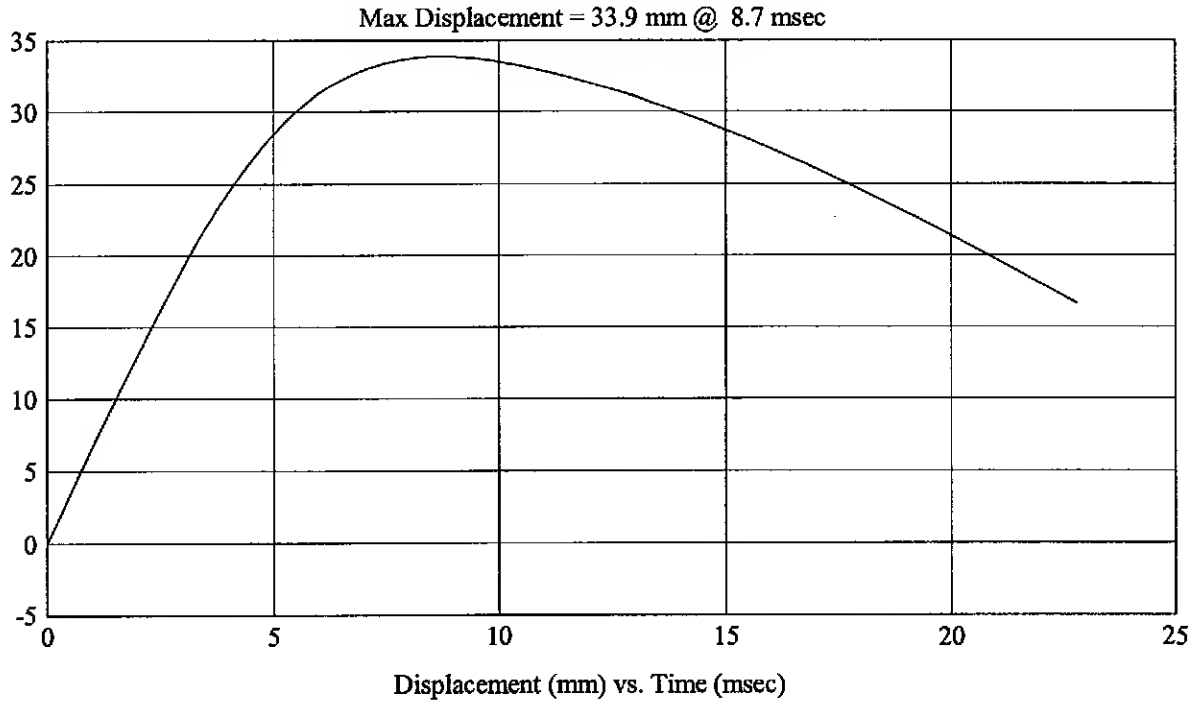
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 4
FM4094
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/3

HIC(d) = 714, HIC = 725, Delta T = 5.4 msec



110a Impact Testing
4/21/01 G0417-0007
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40002 TEST#8 LEFT BP3
HV IMPACT ANGLE= 270 / 1
M4008 PRE-TEST

Impact Testing
4/21/04 6047-CC01.7
2004 LAND ROVER FREELANDER
FMVSS 2010 - UPPER INTERIOR
0602 TEST#8 LEFT BP3
HV IMPACT ANGLE= 270 / 1
FM4098 POST-TEST

4/21/04

Impact Testing

4/21/04

G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST#8 LEFT BP3

H/V IMPACT ANGLE= 270 / 1

FM4098

POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40602 VEHICLE YR/MAKE/MODEL: 2004 LAND ROVER FREELANDER

GENERAL TEST PARAMETERS:

Test Number: 8

Target (Vehicle Side) (Left) Right BP3

Temperature: 24 °F (C)

MGA Test Reference No.: FM4098

Humidity: 31 %

Approach Angles: Horizontal 270 °

Time of Test: 11:49 am pm

Vertical 1 °

FMH Serial No: 38

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
<u>571</u>	<u>536</u>	<u>7.6</u>	<u>23.7</u>	<u>17</u>	<u>3</u>

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
<u>X</u>	<u>5</u>	<u>J36197</u>	<u>-107.3</u>	<u>1.20</u>	<u>1.20</u>
<u>Y</u>	<u>6</u>	<u>J36193</u>	<u>101.1</u>	<u>1.23</u>	<u>1.23</u>
<u>Z</u>	<u>7</u>	<u>J36353</u>	<u>97.1</u>	<u>1.51</u>	<u>1.51</u>

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): _____

NO VISIBLE DAMAGE

Recorded By: [Signature]

Approved By*: [Signature]

Date: 4/21/04

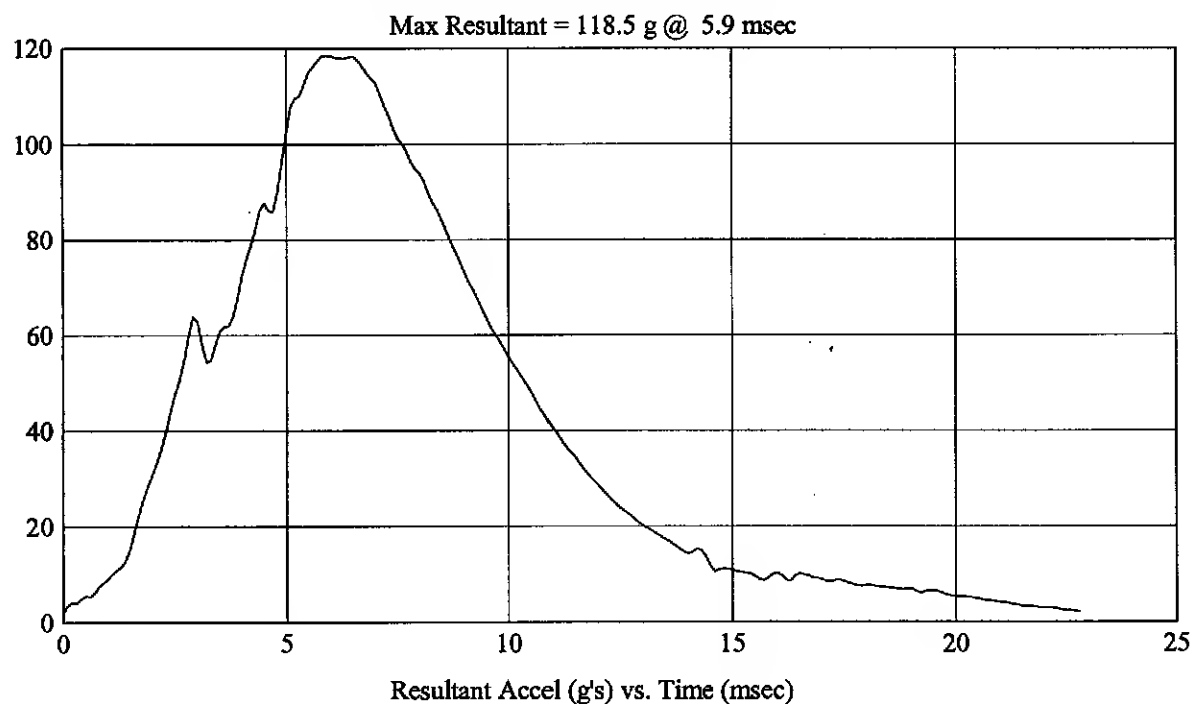
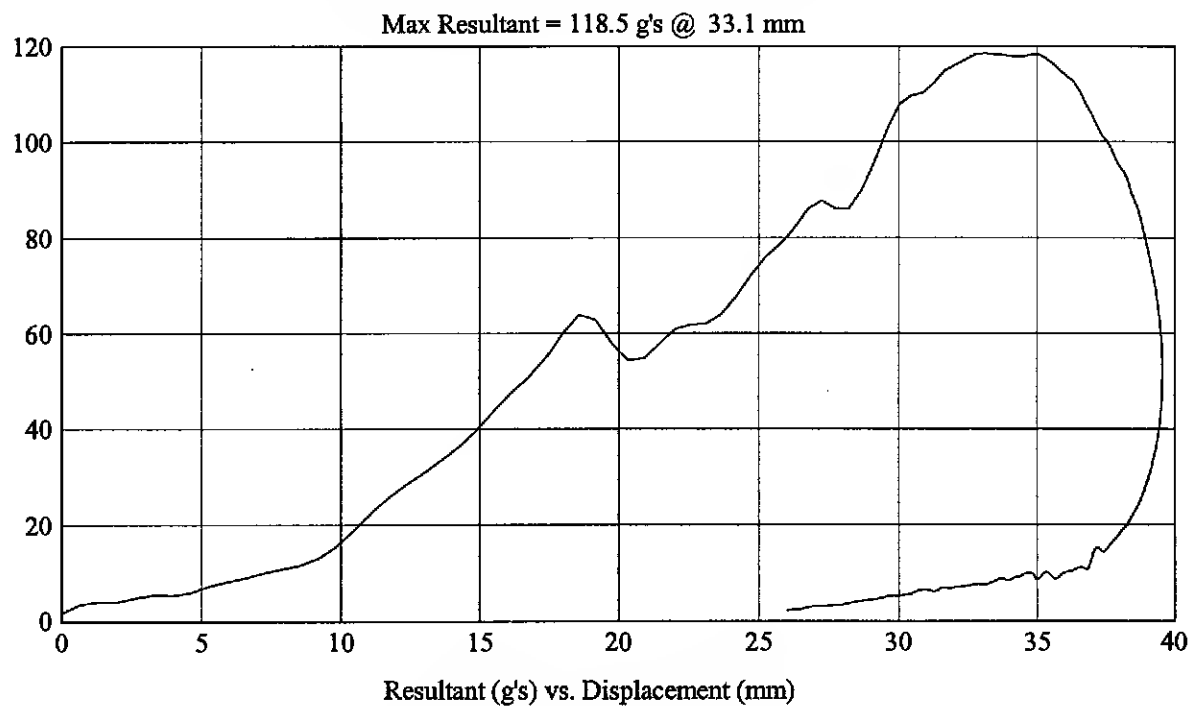
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 8
FM4098
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/1

HIC(d) = 571, HIC = 536, Delta T = 7.6 msec

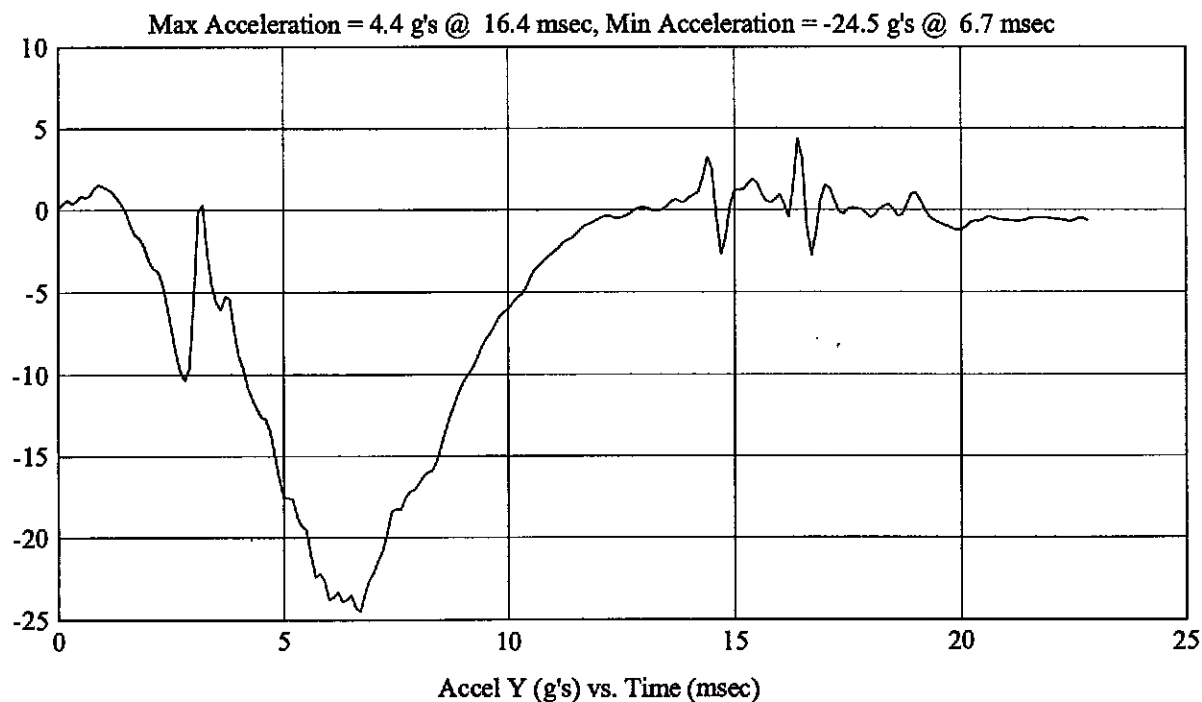
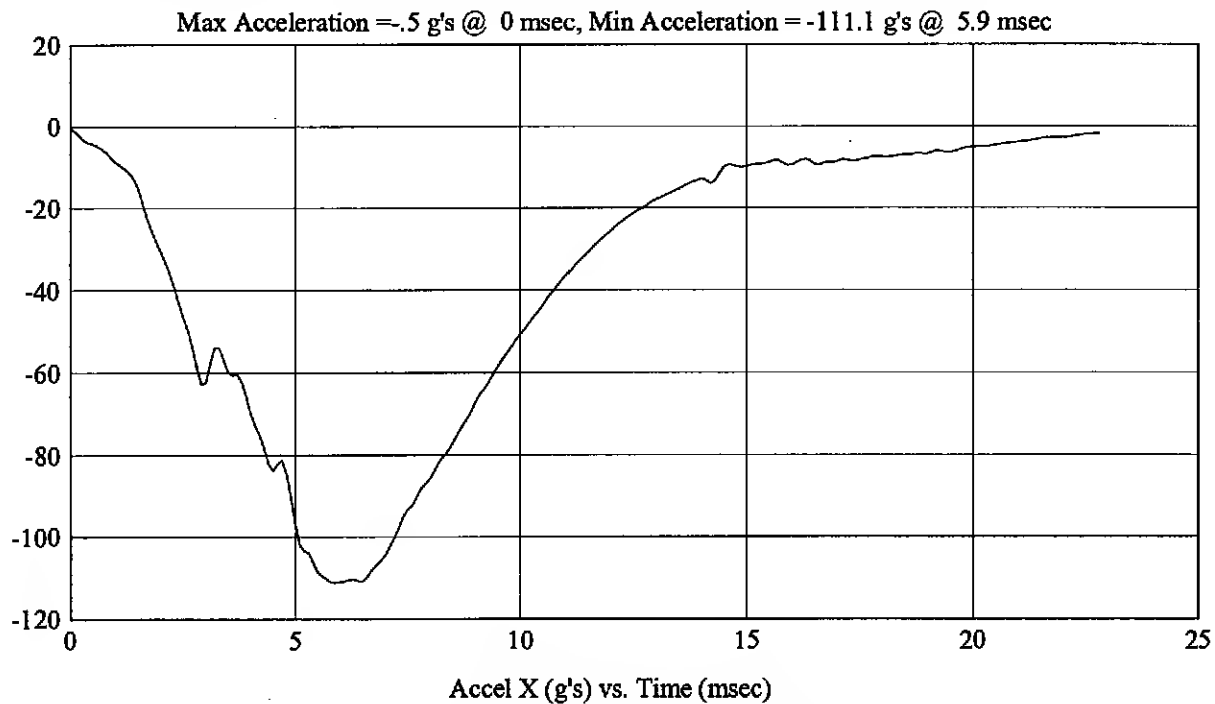


FMH
G04I7-001.7Customer: LAND ROVER
Test # 8
FM4098
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/1

HIC(d) = 571, HIC = 536, Delta T = 7.6 msec



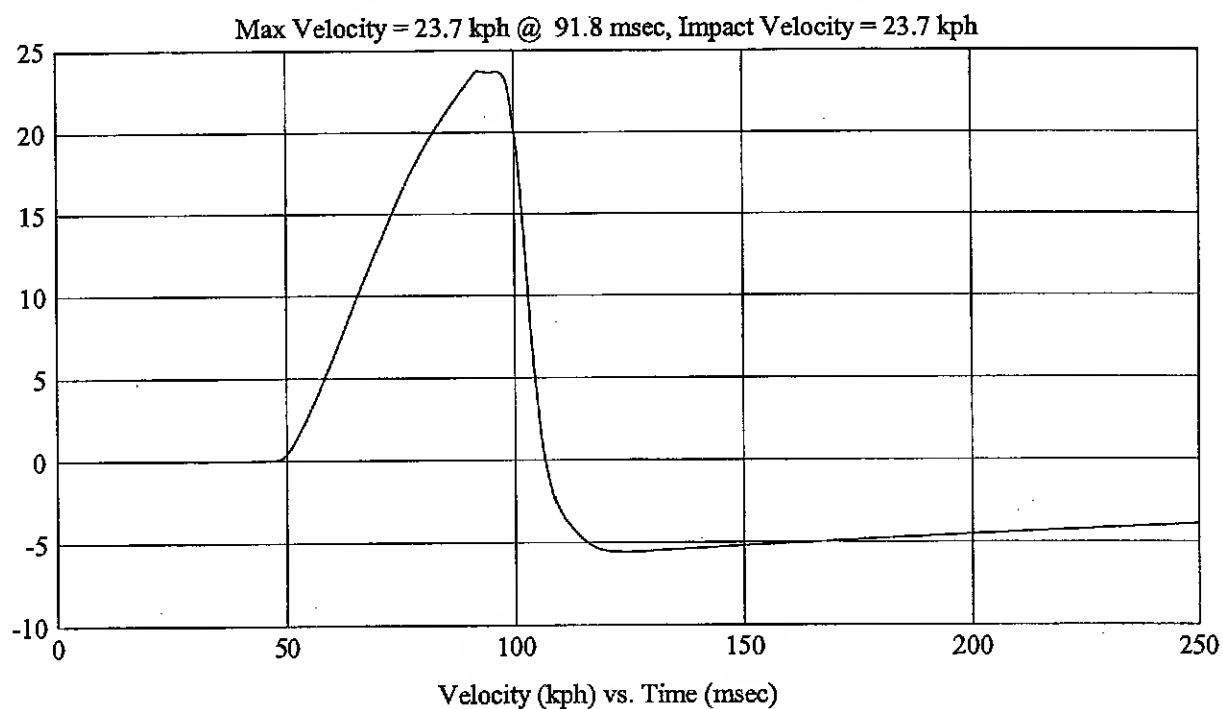
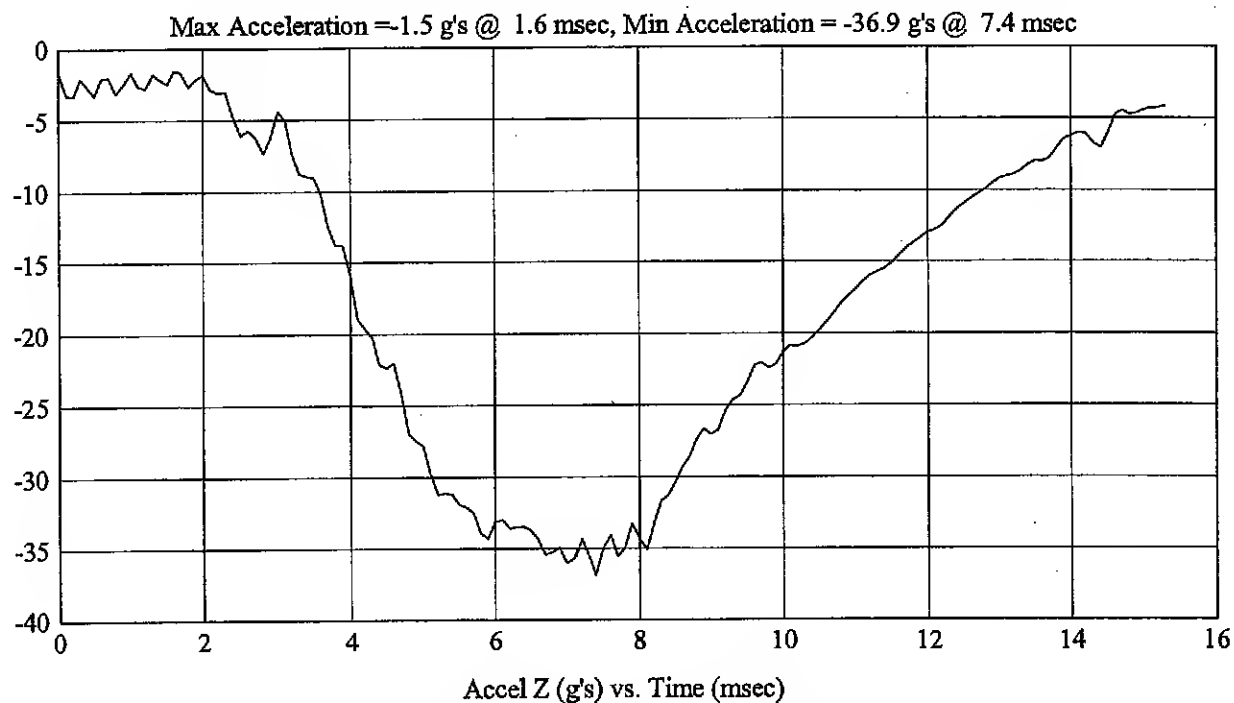
FMH
G04I7-001.7Customer: LAND ROVER
Test # 8
FM4098
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/21/04

Model Year: 2004
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/1

HIC(d) = 571, HIC = 536, Delta T = 7.6 msec



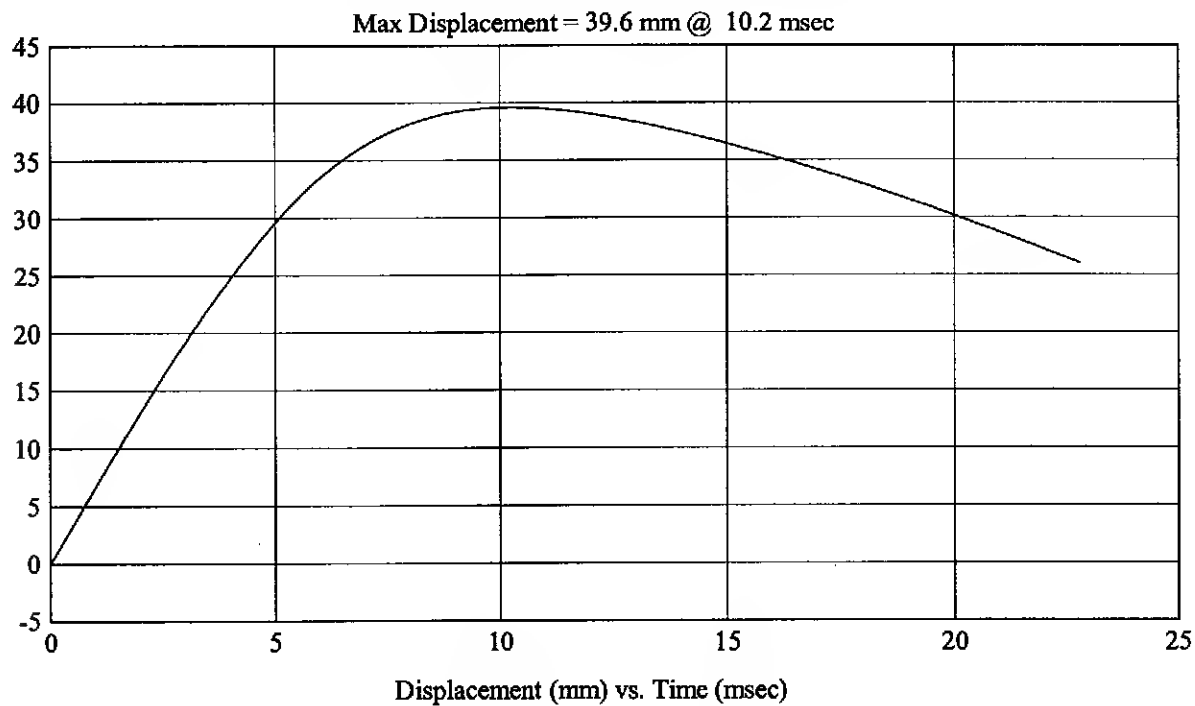
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 8
FM4098
Additional Desc: N/A

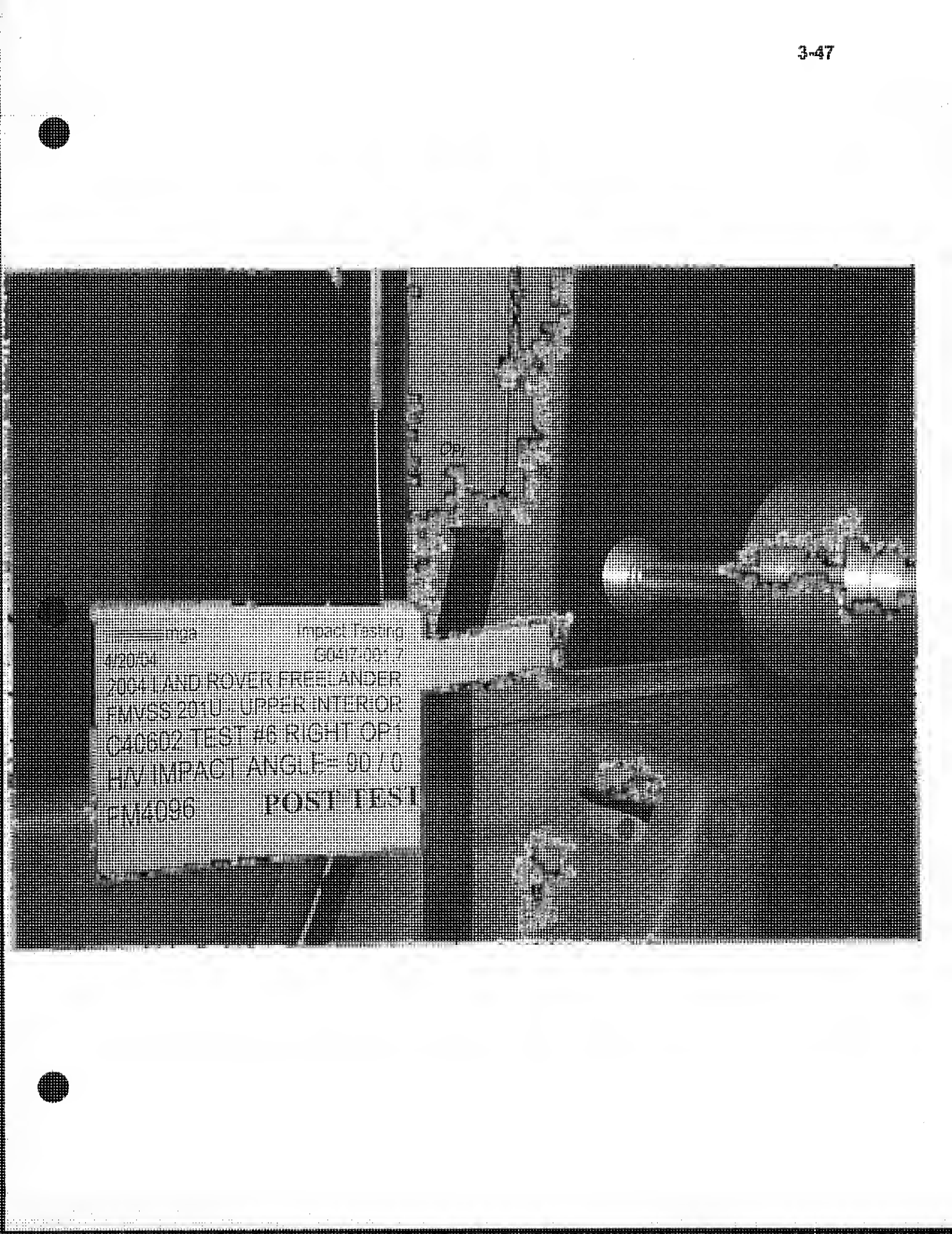
Vehicle Program : FREELANDER

Model Year: 2004
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/1

HIC(d) = 571, HIC = 536, Delta T = 7.6 msec



12404
2001 LAND ROVER FREELANDER
FMVSS 2010 - UPPER INTERIOR
C40602 TEST #6 RIGHT OP1
HV IMPACT ANGLE = 90 / 0
FM4096 PRE-TEST



The photograph shows a dark, textured metal surface, likely part of a vehicle's interior. A rectangular label is affixed to the surface. To the right of the label, there is a bright, circular impact mark with a radial pattern of cracks or deformation. The label contains the following text:

Area Impact Testing
42034 6047.0017
7061 AND ROVER FREELANDER
FLVSS 201U UPPER INTERIOR
040602 TEST #6 RIGHT CP1
HV IMPACT ANGLE= 90/0
FM4096 POST TEST

_____ nrga impact Testing
4/20/01 G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST #6 RIGHT OP1
H/V IMPACT ANGLE= 90 / 0
FM4096 POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: CO117-019.1 VEHICLE YR/MAKE/MODEL: 2004 LAMARCA FREE-ANCA

GENERAL TEST PARAMETERS:

Test Number: 6

Target (Vehicle Side): left/right OP1

Temperature: 22 °F °C

MGA Test Reference No.: FM4096

Humidity: 31 %

Approach Angles: Horizontal 90 °

Time of Test: 5:30 am/pm pm

Vertical 6 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
689	693	6.0	23.9	27	4

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-102.3	1.20	1.20
Y	6	J35916	99.3	1.23	1.23
Z	7	J35918	98.7	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

NO VISIBLE DAMAGE

Recorded By: [Signature]

Approved By*: [Signature]

Date: 4/10/03

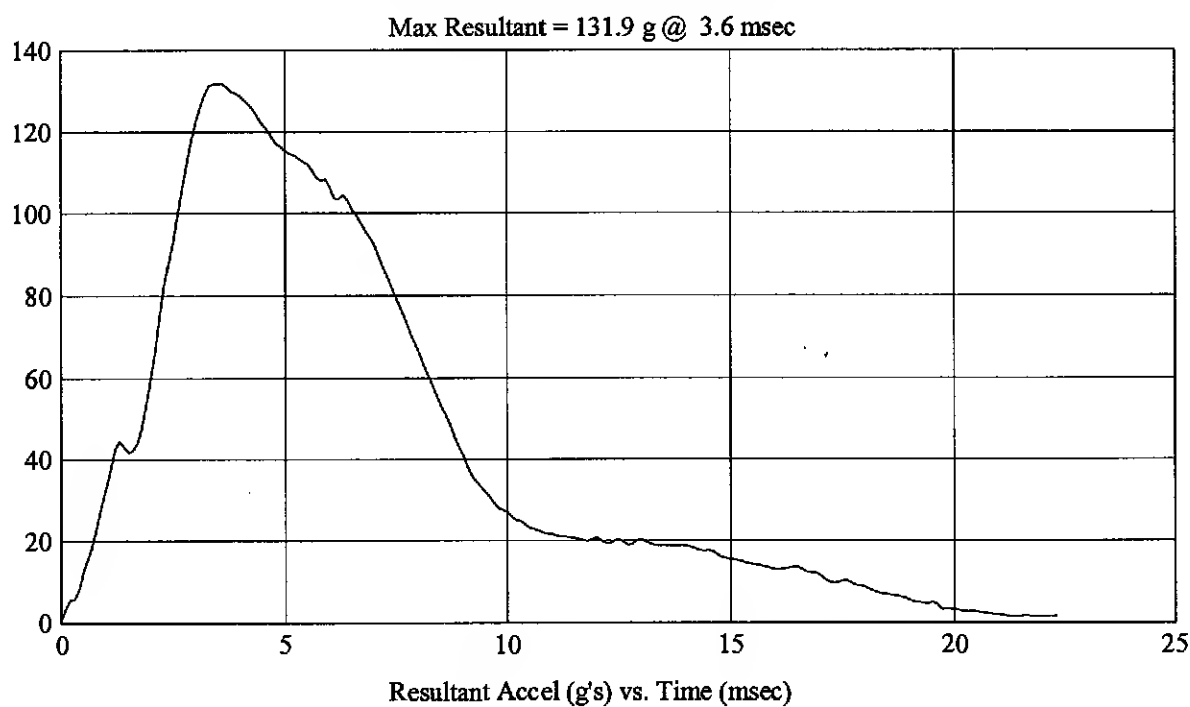
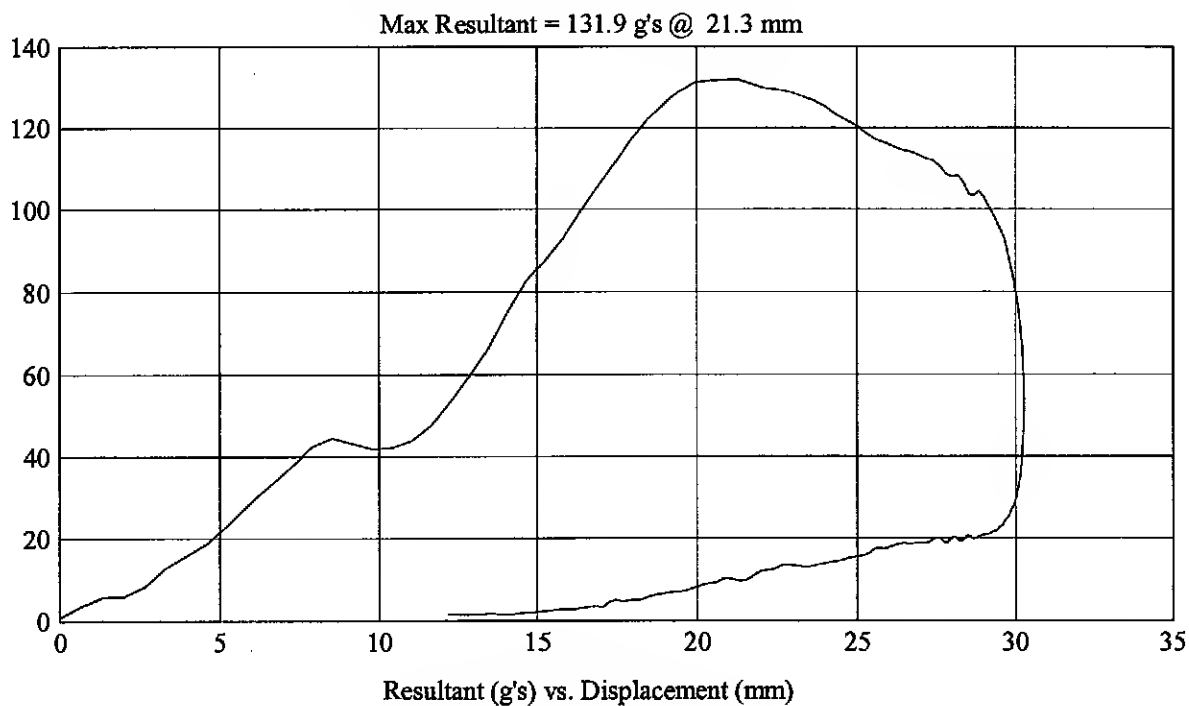
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 6
FM4096
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: OP1
Vehicle Side: Right
Horz/Vert Angle: 90/0

HIC(d) = 689, HIC = 693, Delta T = 6 msec

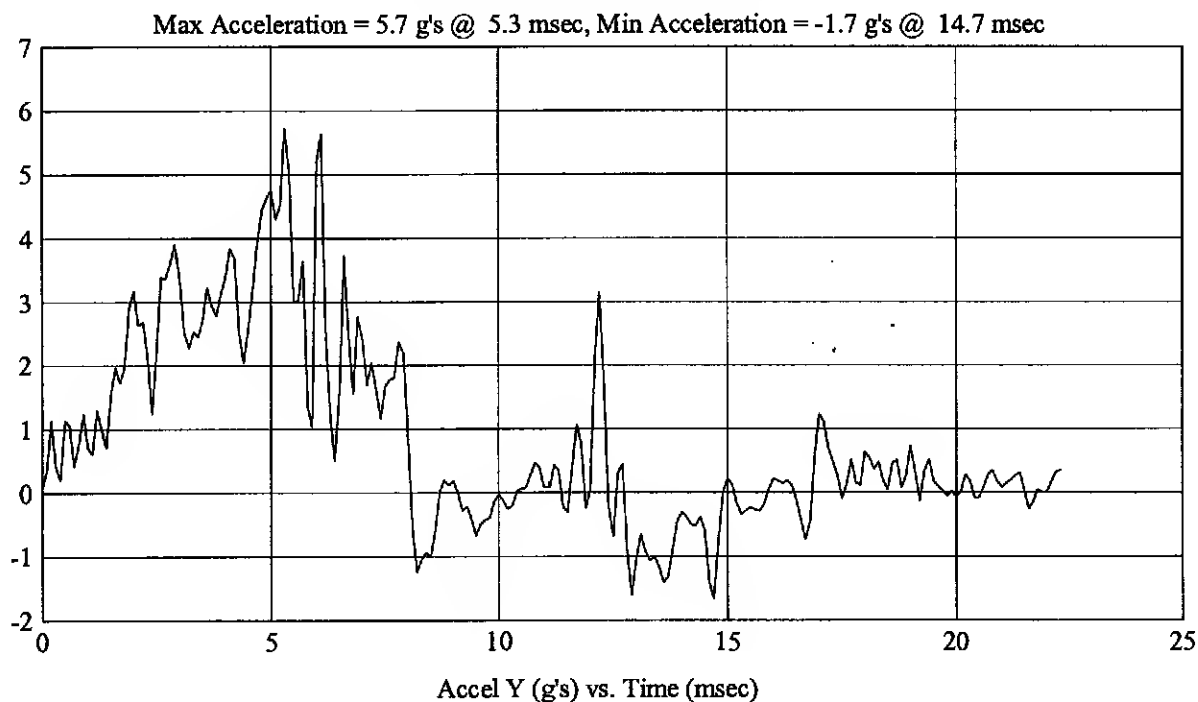
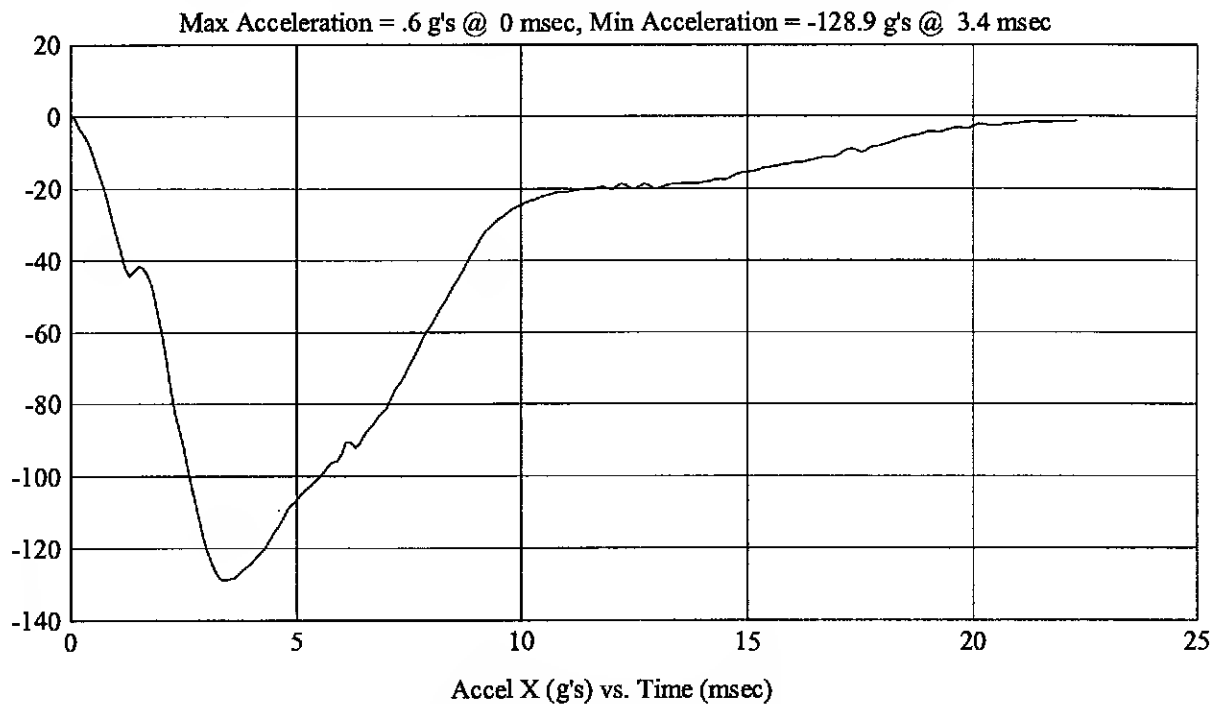


FMH
G04I7-001.7Customer: LAND ROVER
Test # 6
FM4096
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: OP1
Vehicle Side: Right
Horz/Vert Angle: 90/0

HIC(d) = 689, HIC = 693, Delta T = 6 msec



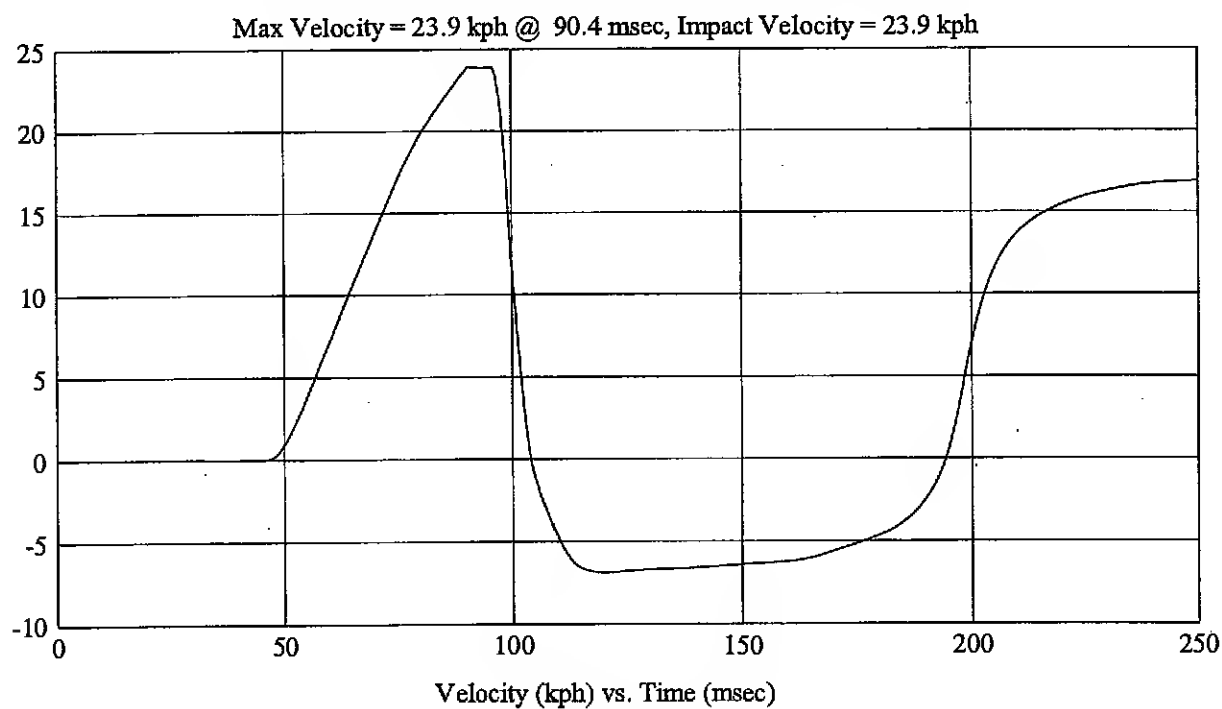
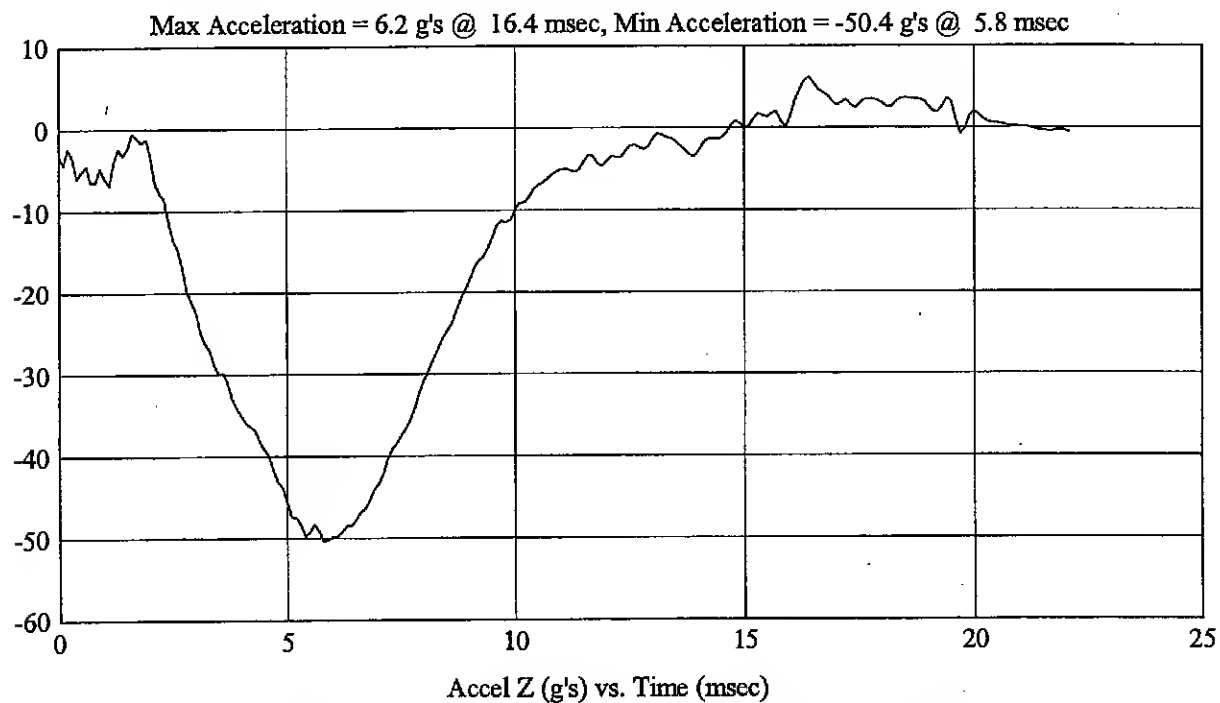
FMH
G04I7-001.7Customer: LAND ROVER
Test # 6
FM4096
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/20/04

Model Year: 2004
Target: OP1
Vehicle Side: Right
Horz/Vert Angle: 90/0

HIC(d) = 689, HIC = 693, Delta T = 6 msec



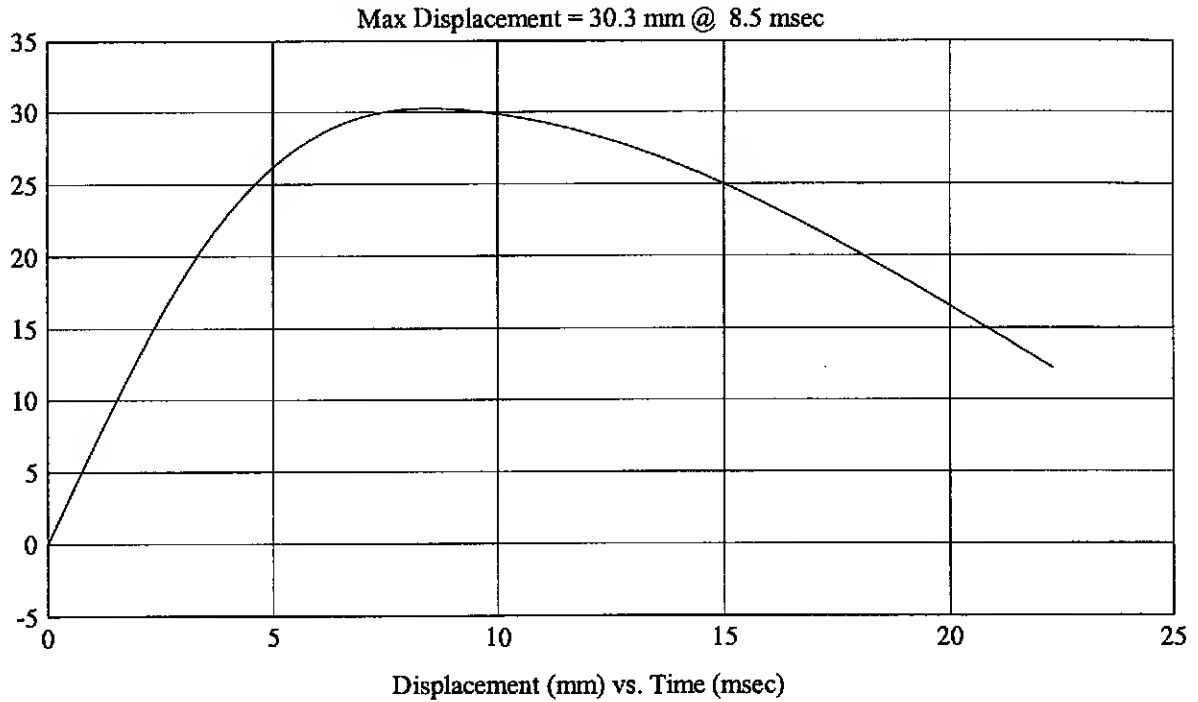
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 6
FM4096
Additional Desc: N/A


Vehicle Program : FREELANDER

Model Year: 2004
Target: OP1
Vehicle Side: Right
Horz/Vert Angle: 90/0

HIC(d) = 689, HIC = 693, Delta T = 6 msec



113a Impact Testing
12104 G047-0017
2004 LAND ROVER FREELANDER
FMVSS 2010 - UPPER INTERIOR
C40602 TEST #10 LEFT SR2(A)
HV IMPACT ANGLE = 270 / 24
FM4100 PRETEST



Impact Testing
4/21/04 G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST #10 LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 24
FM4100 POST-TEST

Impact Testing

4/21/04 G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST #10 LEFT SR2(A)

H/V IMPACT ANGLE= 270 / 24

FM4100 POST-TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40602 VEHICLE YR/MAKE/MODEL: 2001 LAND ROVER FREELANDER

GENERAL TEST PARAMETERS:

Test Number: 10

Target (Vehicle Side): Left/Right SR2A

Temperature: 25 °F/°C

MGA Test Reference No.: Fm4100

Humidity: 42 %

Approach Angles: Horizontal 270 °

Time of Test: 2:26 am/pm

Vertical 24 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
626	609	6.8	23.9	20	10

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-91.6	1.20	1.20
Y	6	J35919	94.1	1.23	1.23
Z	7	J36382	84.3	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

SLIGHT HEADLINE DEFORMATION

Recorded By: [Signature]

Approved By*: Heleen K. Kales

Date: 4/24/04

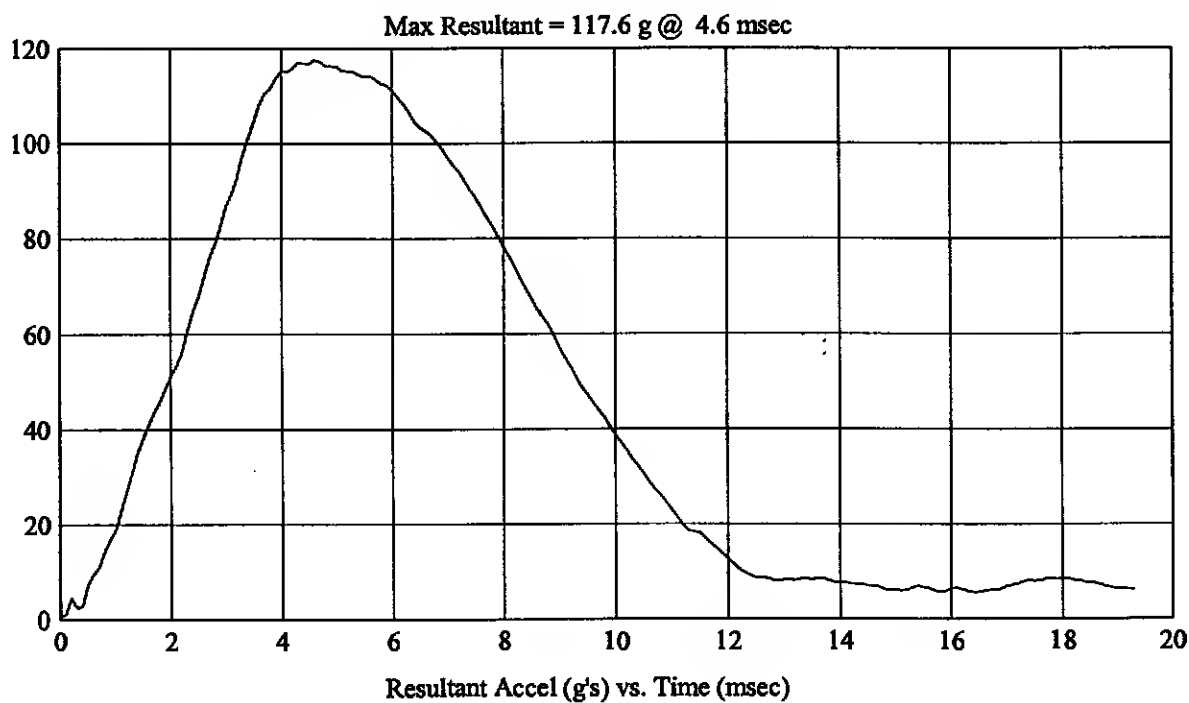
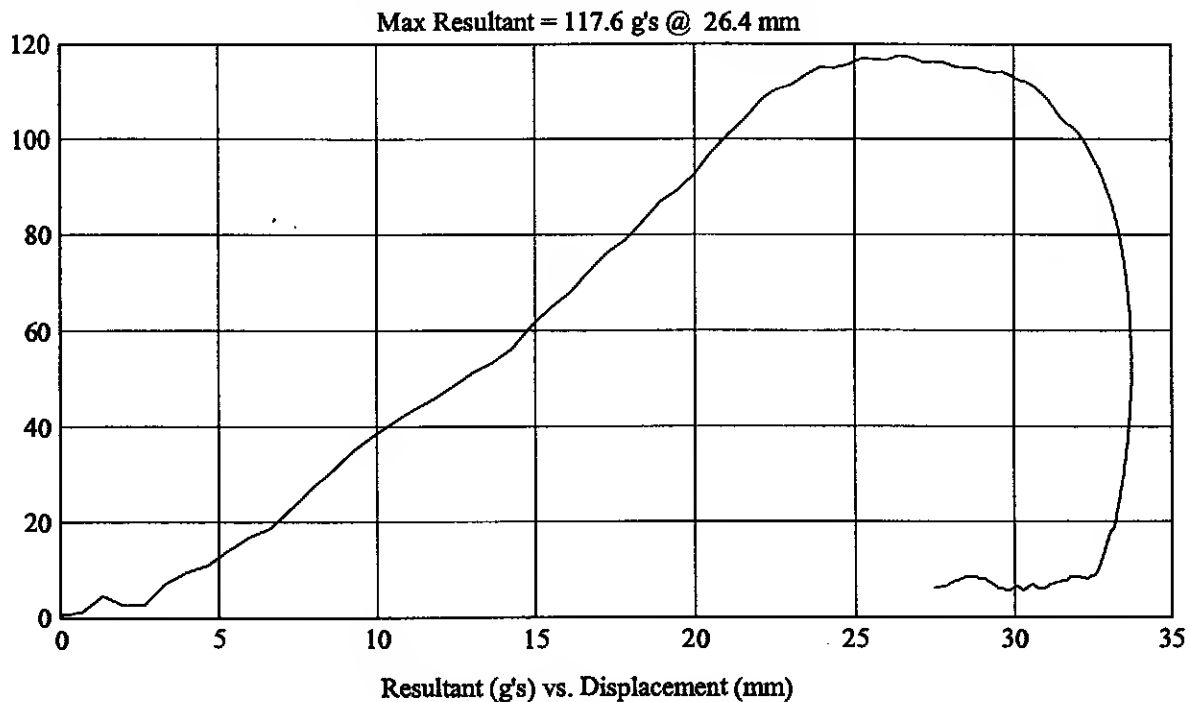
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 10
FM4100
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/24

HIC(d) = 626, HIC = 609, Delta T = 6.8 msec

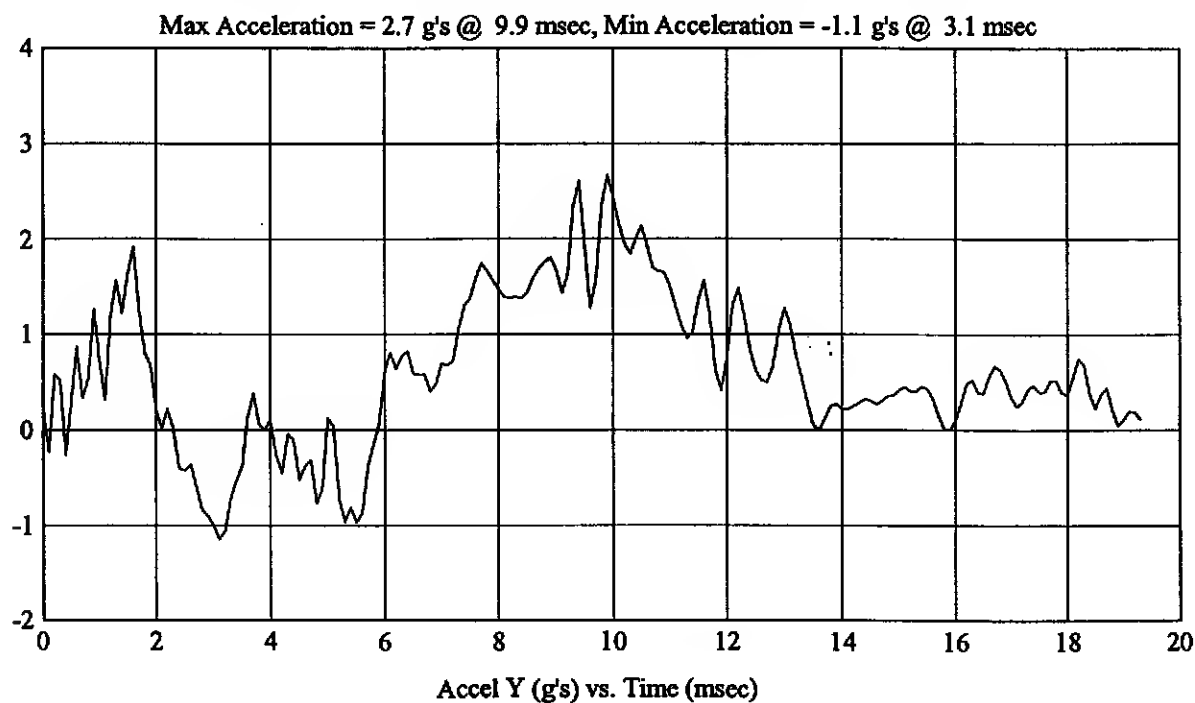
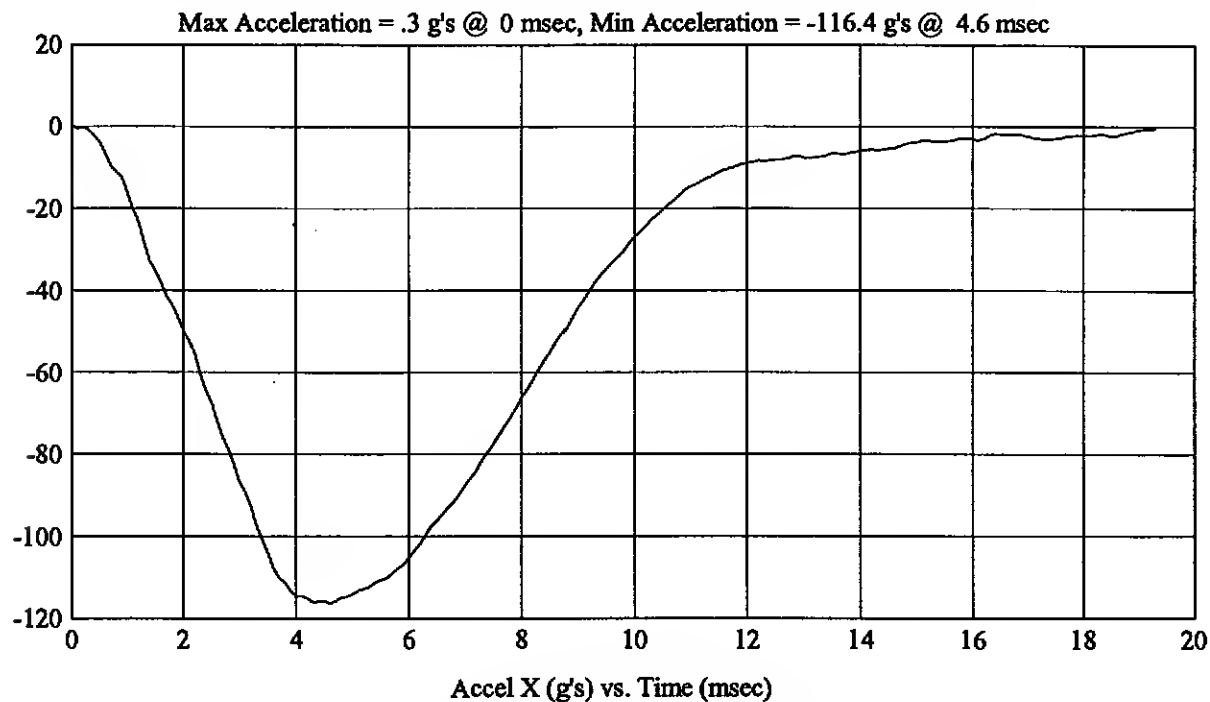


FMH
G04I7-001.7Customer: LAND ROVER
Test # 10
FM4100
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/24

HIC(d) = 626, HIC = 609, Delta T = 6.8 msec



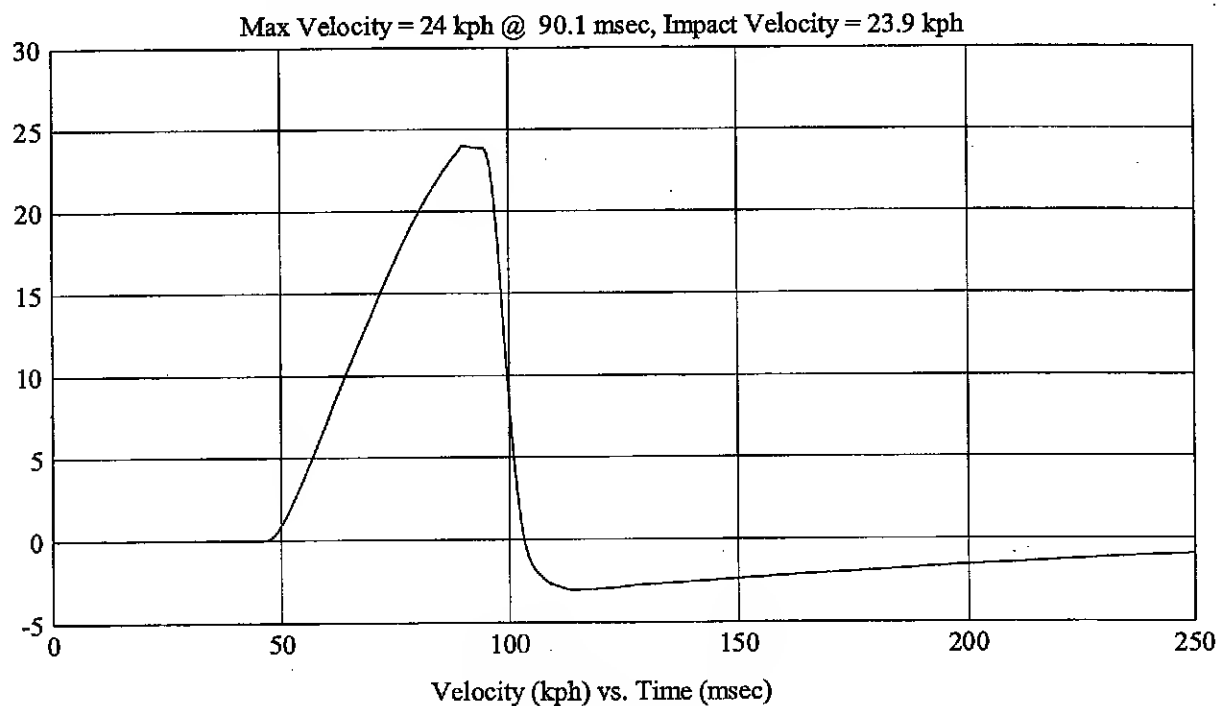
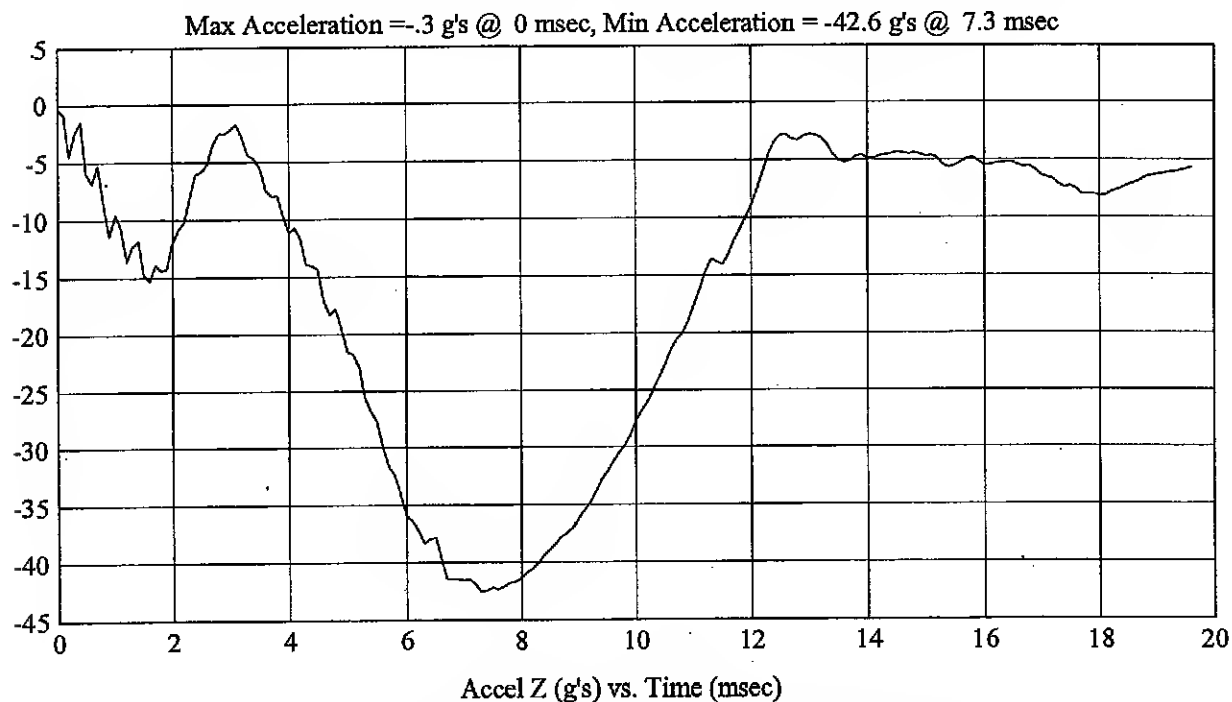
FMH
G04I7-001.7Customer: LAND ROVER
Test # 10
FM4100
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/21/04

Model Year: 2004
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/24

HIC(d) = 626, HIC = 609, Delta T = 6.8 msec



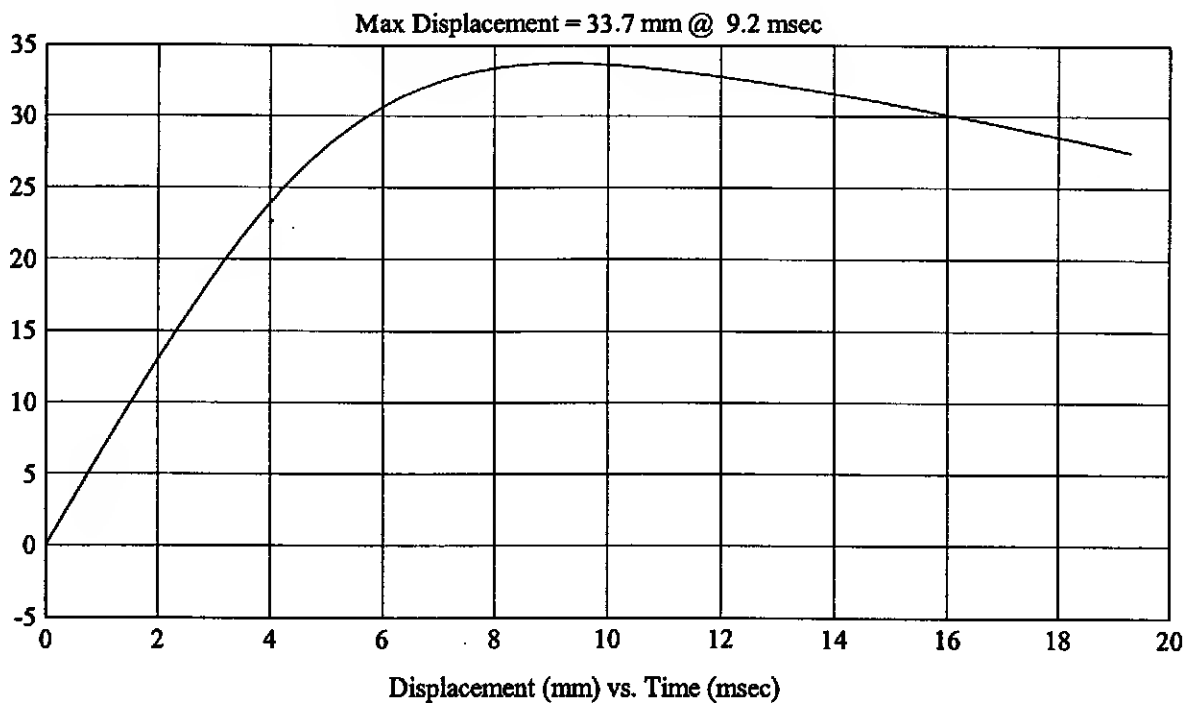
FMH
G04I7-001.7

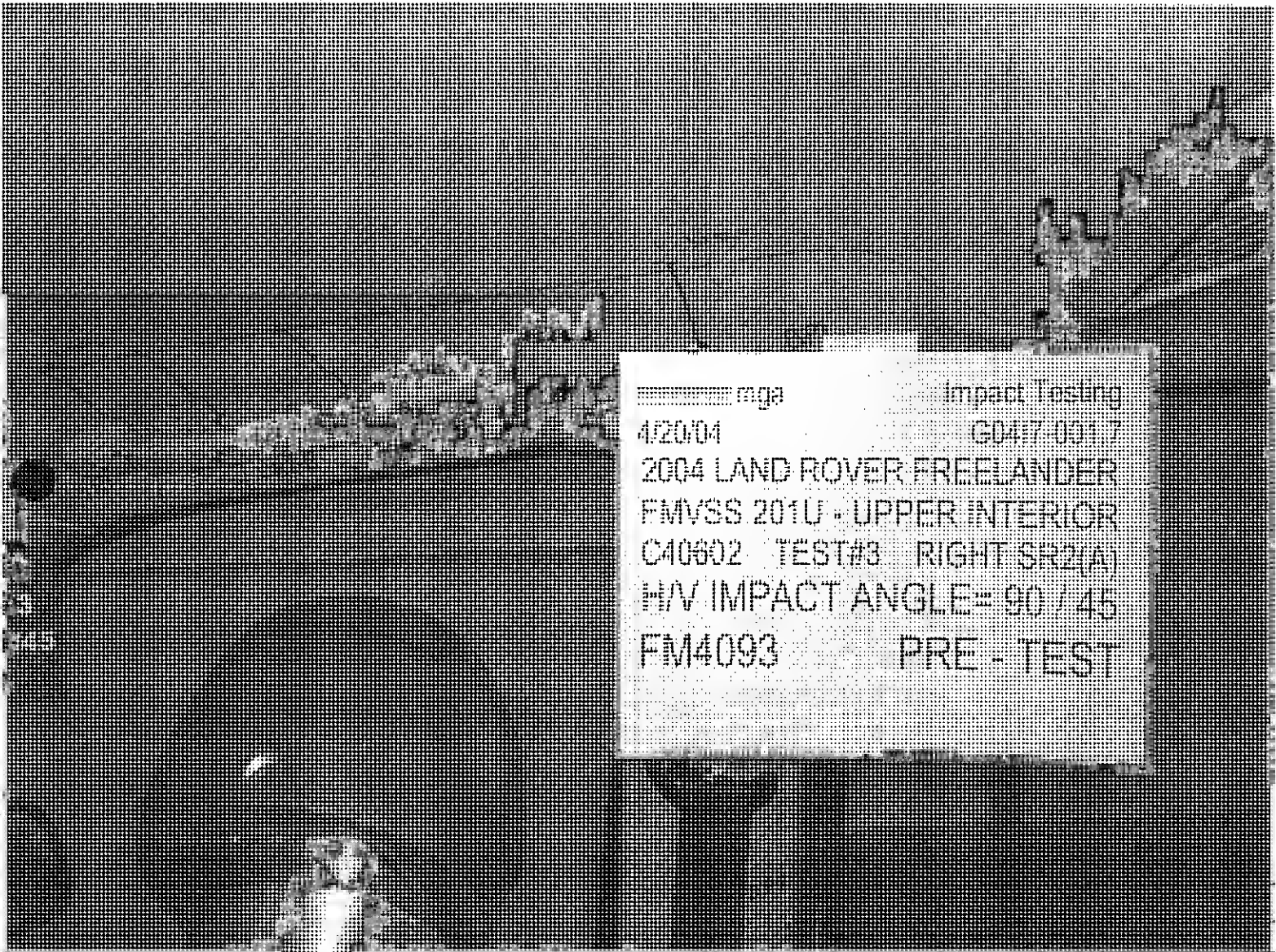
Customer: LAND ROVER
Test # 10
FM4100
Additional Desc: N/A

Vehicle Program : FREELANDER

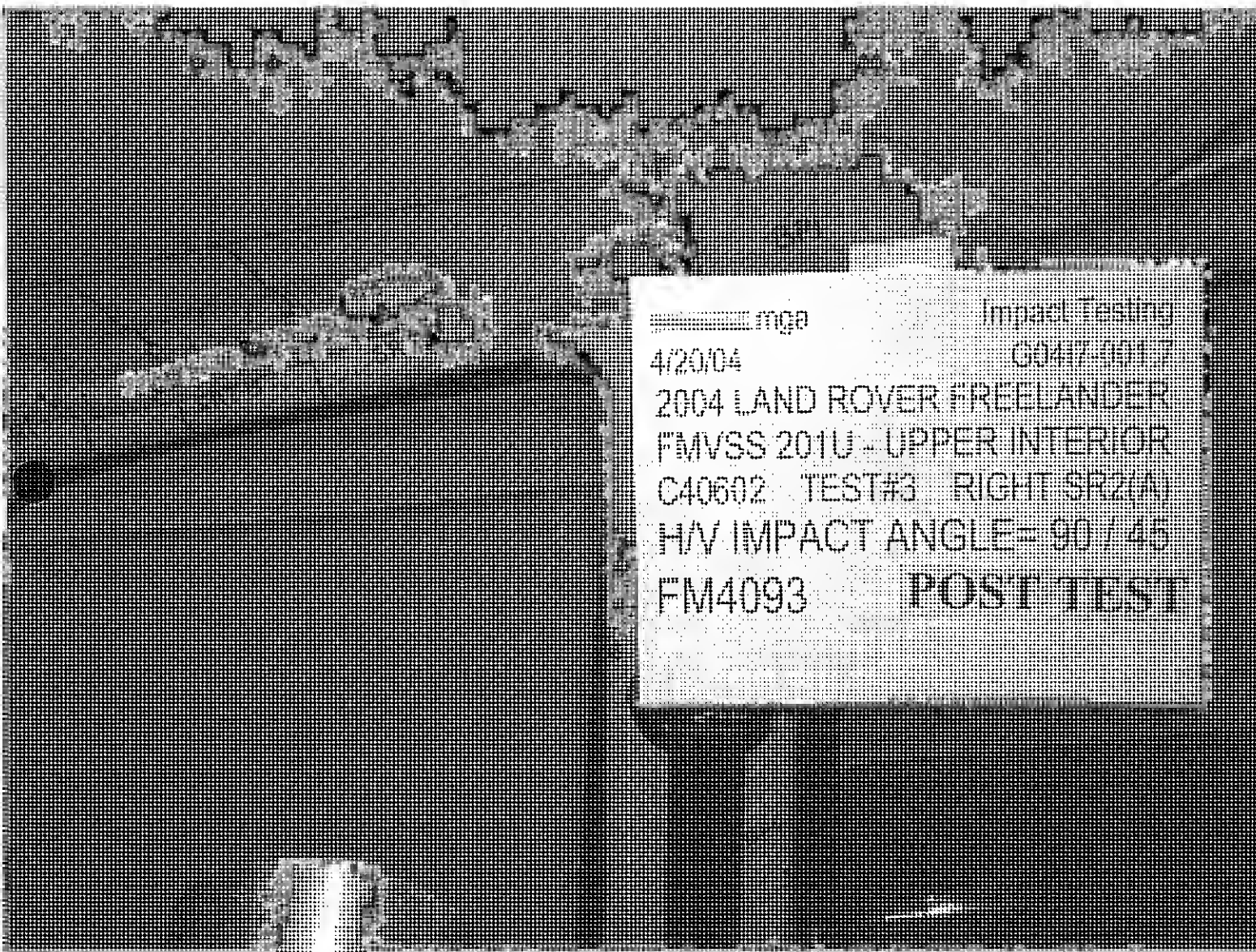
Model Year: 2004
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/24

HIC(d) = 626, HIC = 609, Delta T = 6.8 msec





Impact Testing
4/20/04 G0417-00117
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST#3 RIGHT SR2(A)
H/V IMPACT ANGLE= 90 / 45
FM4093 PRE - TEST



===== mgb

Impact Testing

4/20/04

G0417-0017

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST#3 RIGHT SR2(A)

H/V IMPACT ANGLE= 90 / 45

FM4093

POST TEST

===== mga

Impact Testing

4/20/04

G0417-001.7

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

FM40602 TEST#3 RIGHT SR2(A)

H/V IMPACT ANGLE= 90 / 45

FM4093

POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: 66477-001.7 VEHICLE YR/MAKE/MODEL: 2004/Isuzu Rodeo/Free Lander

GENERAL TEST PARAMETERS:

Test Number: 3

Target (Vehicle Side): left/right SR2-A

Temperature: 24 °F/°C

MGA Test Reference No.: FMH093

Humidity: 25 %

Approach Angles: Horizontal 90 °

Time of Test: 2:00 am/pm

Vertical 45 °

FMH Serial No: 36

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
746	768	8.6	24.1	3	14

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	9	J35423	-102.3	1.20	1.20
Y	6	J35916	99.3	1.23	1.23
Z	7	J35918	98.7	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

THE GRAB HANDLE WAS COMPRESSED INTO THE SIDE RAIL

Recorded By: [Signature] Approved By: Helen A. Kales Date: 4/20/04

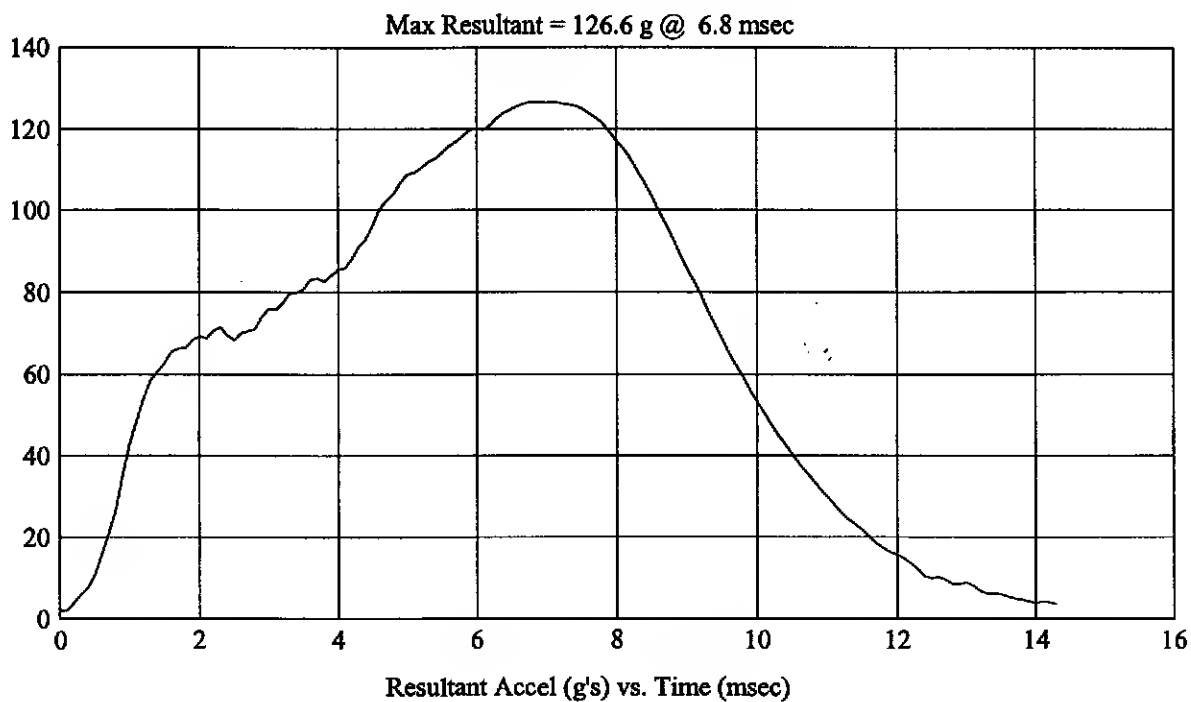
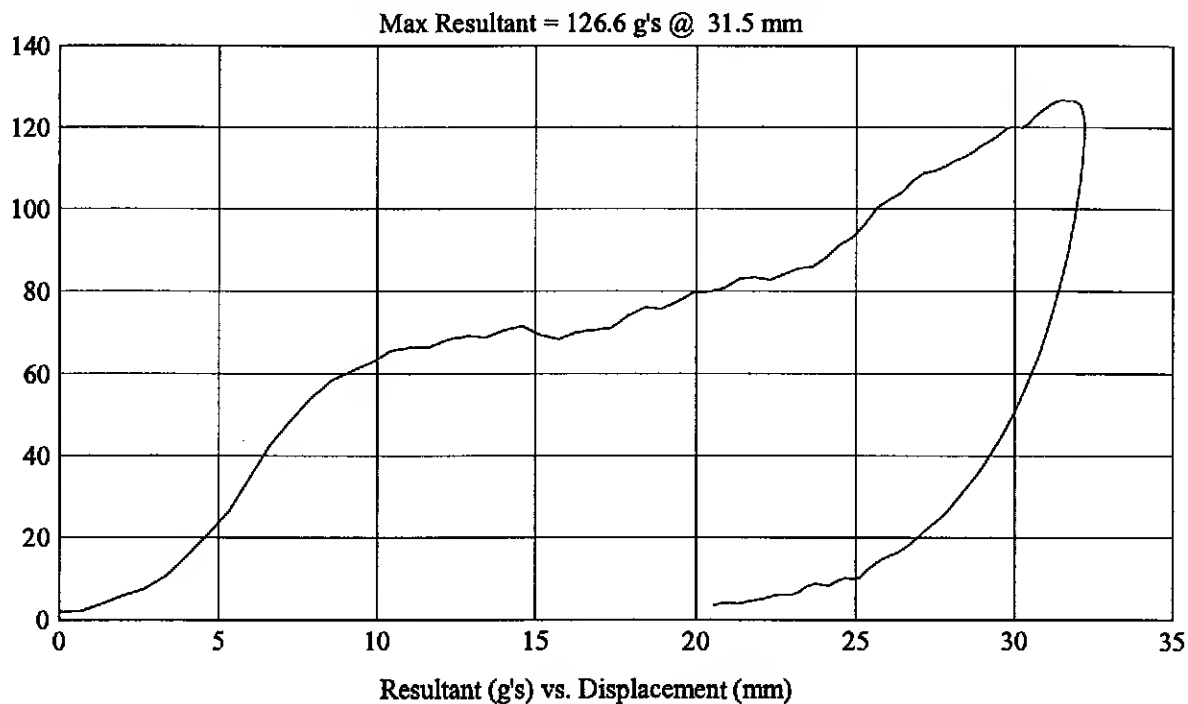
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G0417-001.7Customer: LAND ROVER
Test # 3
FM4093
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: SR2(a)
Vehicle Side: Right
Horz/Vert Angle: 90/45

HIC(d) = 746, HIC = 768, Delta T = 8.6 msec

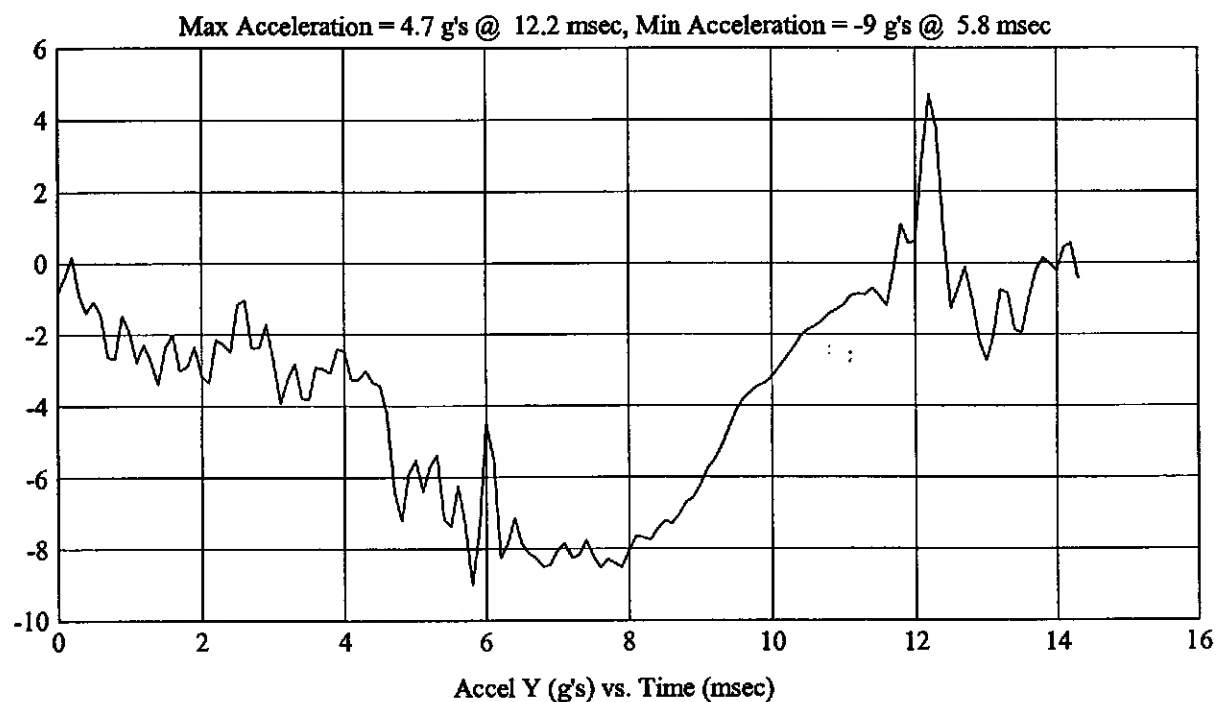
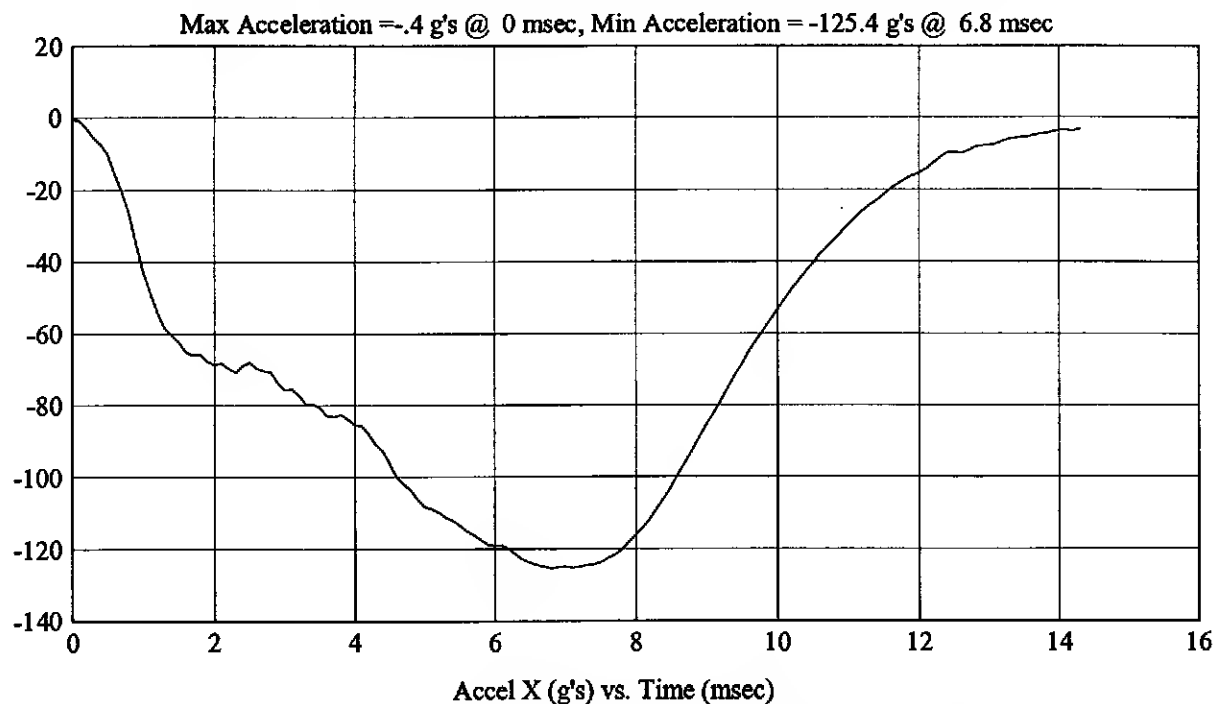


FMH
G04I7-001.7Customer: LAND ROVER
Test # 3
FM4093
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: SR2(a)
Vehicle Side: Right
Horz/Vert Angle: 90/45

HIC(d) = 746, HIC = 768, Delta T = 8.6 msec



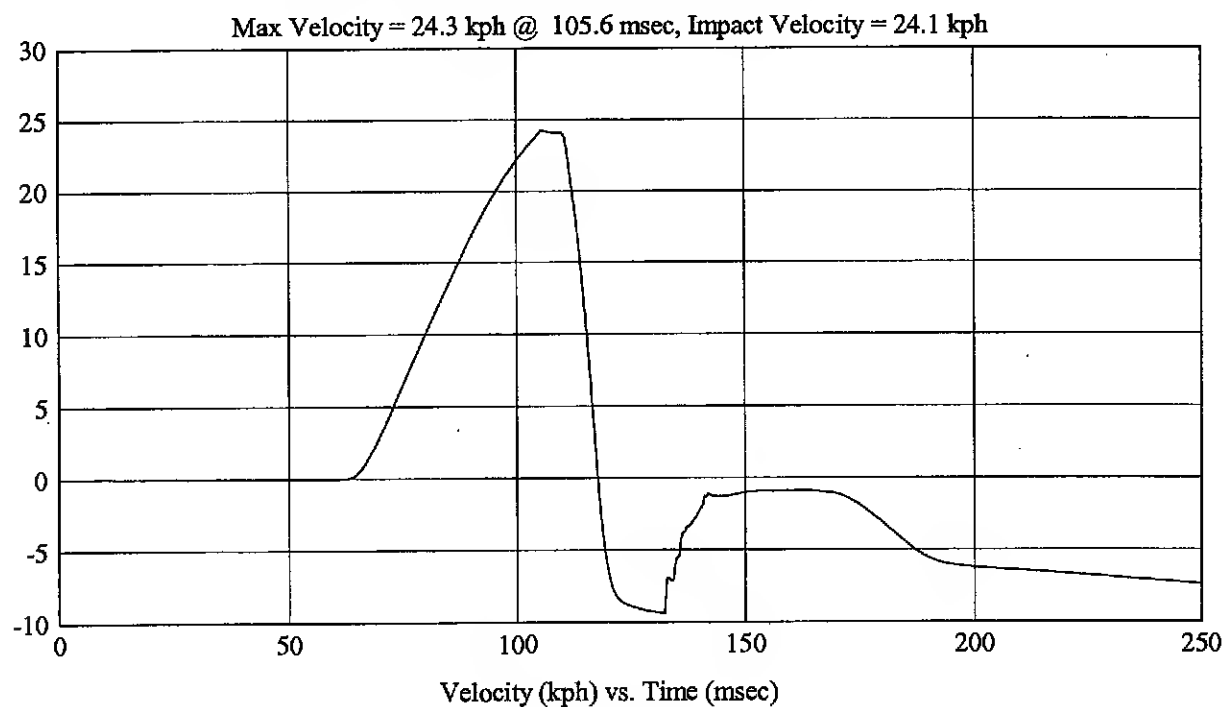
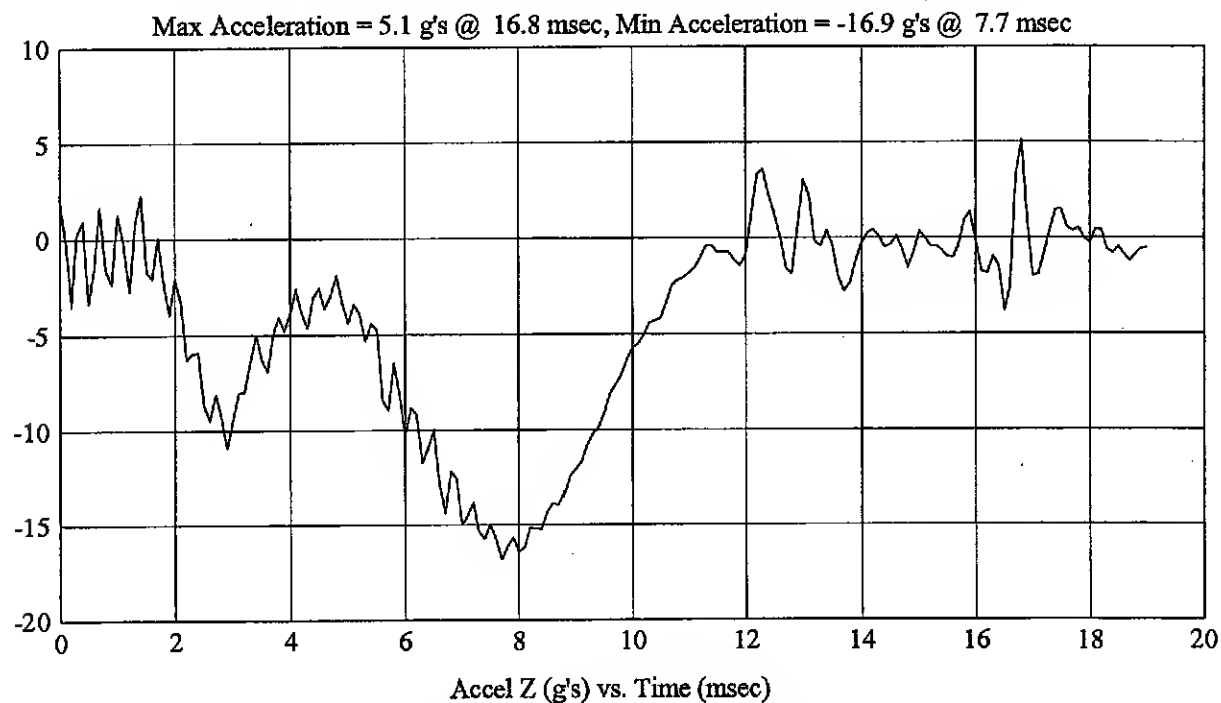
FMH
G04I7-001.7Customer: LAND ROVER
Test # 3
FM4093
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/20/04

Model Year: 2004
Target: SR2(a)
Vehicle Side: Right
Horz/Vert Angle: 90/45

HIC(d) = 746, HIC = 768, Delta T = 8.6 msec



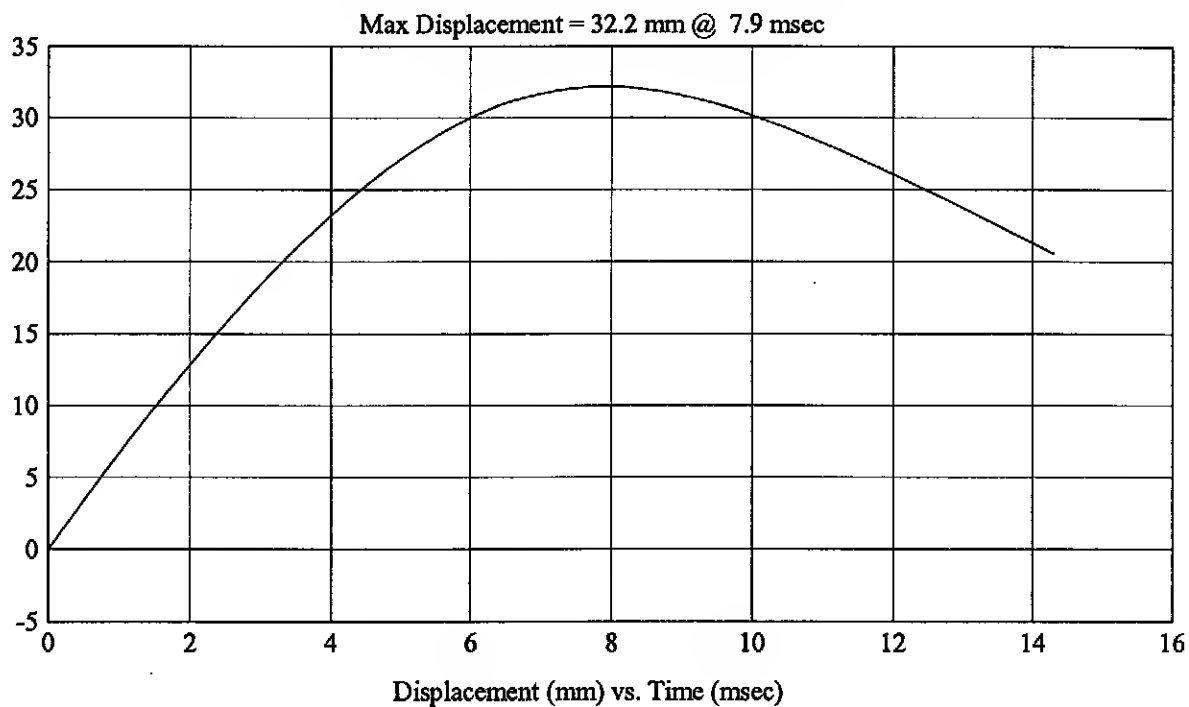
FMH
G04I7-001.7

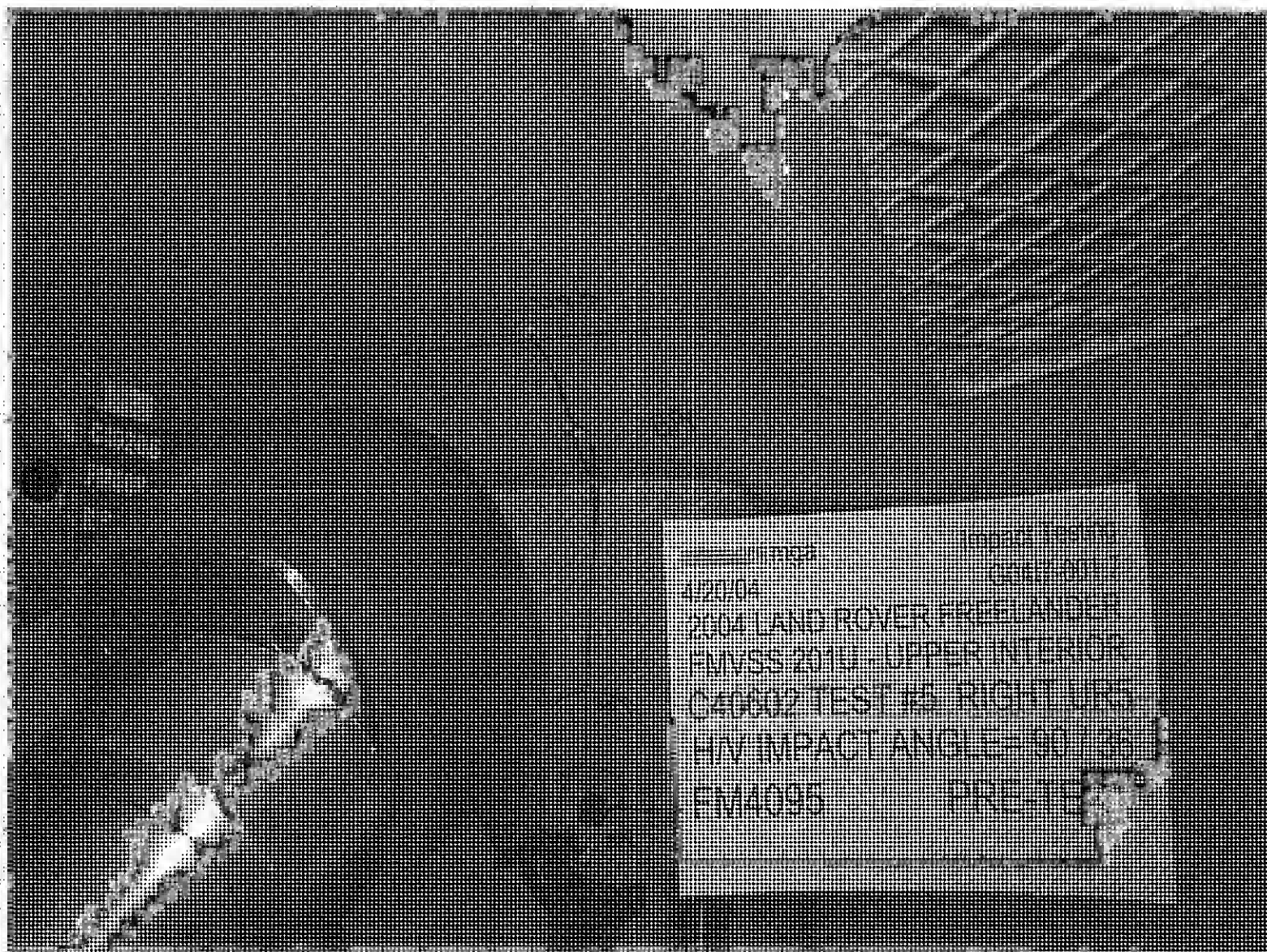
Customer: LAND ROVER
Test # 3
FM4093
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: SR2(a)
Vehicle Side: Right
Horz/Vert Angle: 90/45

HIC(d) = 746, HIC = 768, Delta T = 8.6 msec





===== mga

Impact Testing

4/20/04

G0417-0017

2004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST #5 RIGHT UR5

HV IMPACT ANGLE= 90 / 36

FM4025

POST TEST

Impact Testing
4/20/04 G0417-001.7
2004 LAND ROVER FREELANDER
FMVSS 201U - UPPER INTERIOR
C40602 TEST #5 RIGHT UR5
H/V IMPACT ANGLE= 90 / 36
FM4095 POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40602 VEHICLE YR/MAKE/MODEL: 2004 LANOKAVER Fullman

GENERAL TEST PARAMETERS:

Test Number: 5

Target (Vehicle Side): left/right URS

Temperature: 24 °F/°C

MGA Test Reference No.: FM4095

Humidity: 31 %

Approach Angles: Horizontal 90 °

Time of Test: 4:30 am/pm

Vertical 38 °

FMH Serial No: 38

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
589	560	8.1	23.5	54	0

INSTRUMENTATION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-107.3	1.20	1.20
Y	6	J36193	101.1	1.23	1.23
Z	7	J36353	97.1	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

B-PILLAR TRIM WAS COMPRESSED

Recorded By: [Signature]

Approved By*: [Signature]

Date: 4/20/03

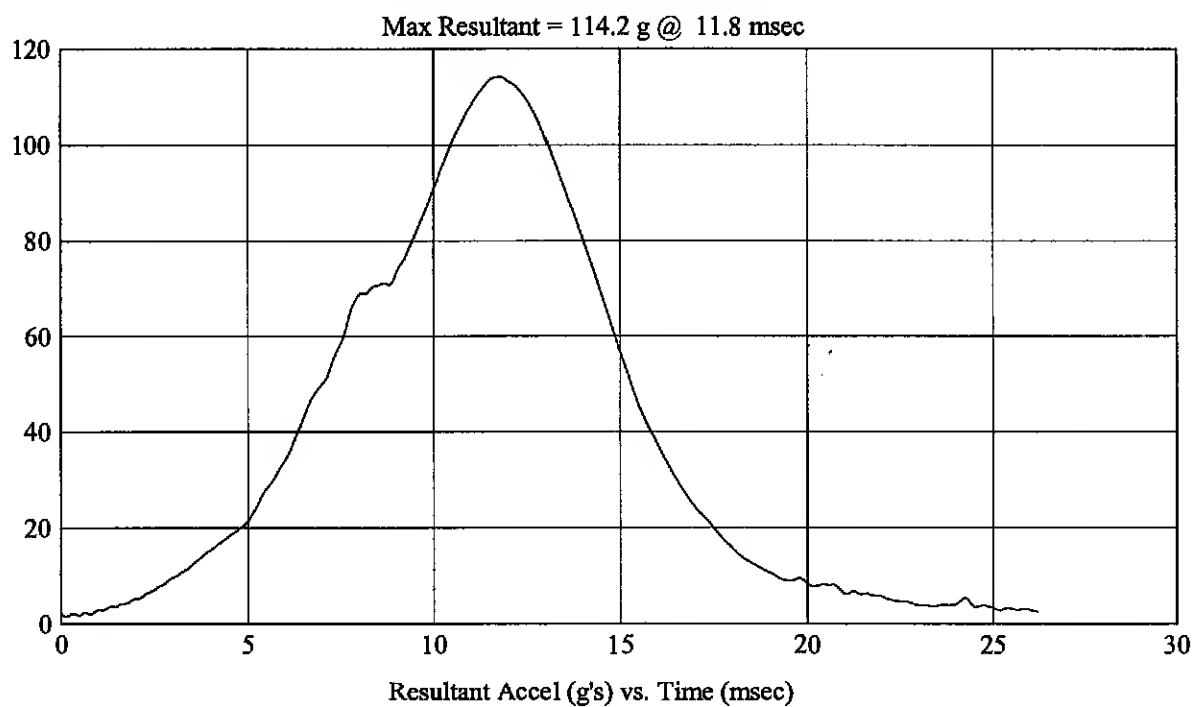
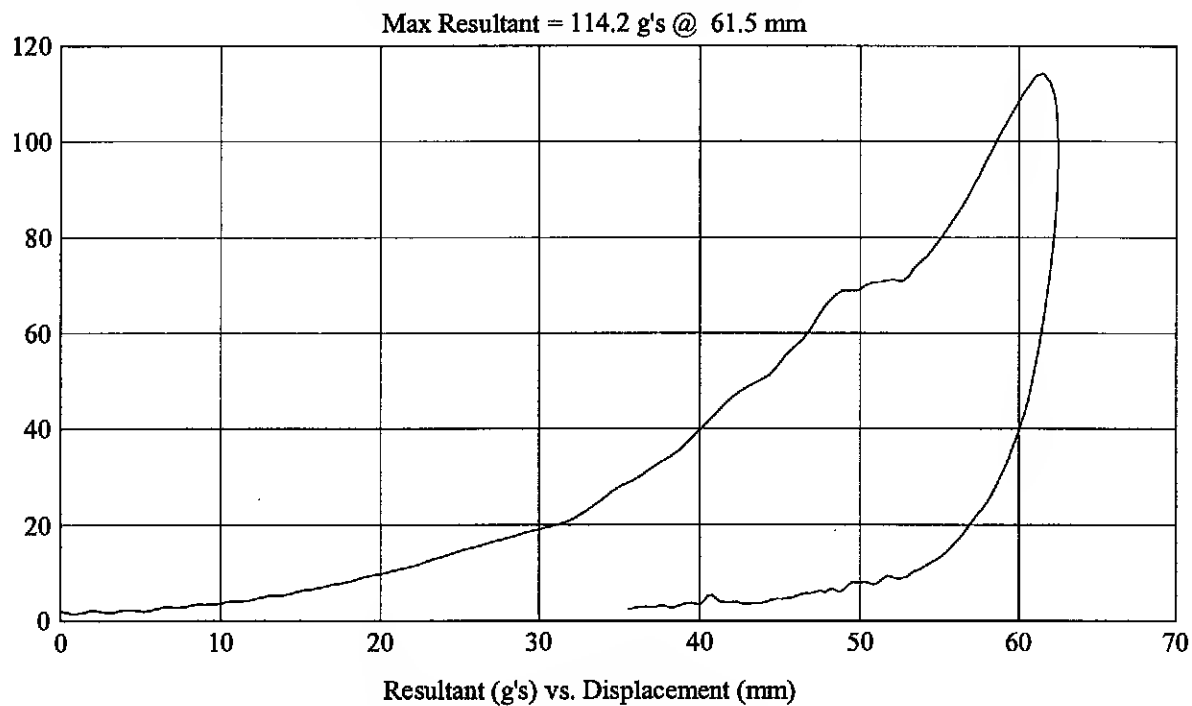
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.7Customer: LAND ROVER
Test # 5
FM4095
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: UR5
Vehicle Side: Right
Horz/Vert Angle: 90/36

HIC(d) = 589, HIC = 560, Delta T = 8.1 msec

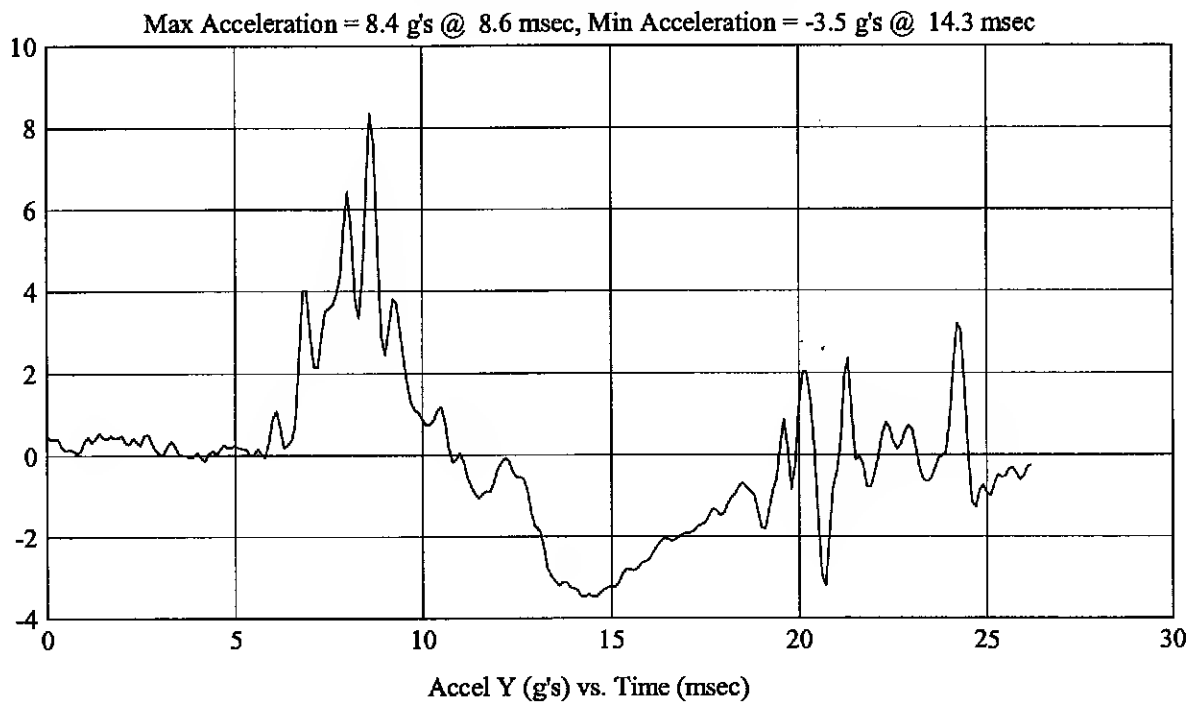
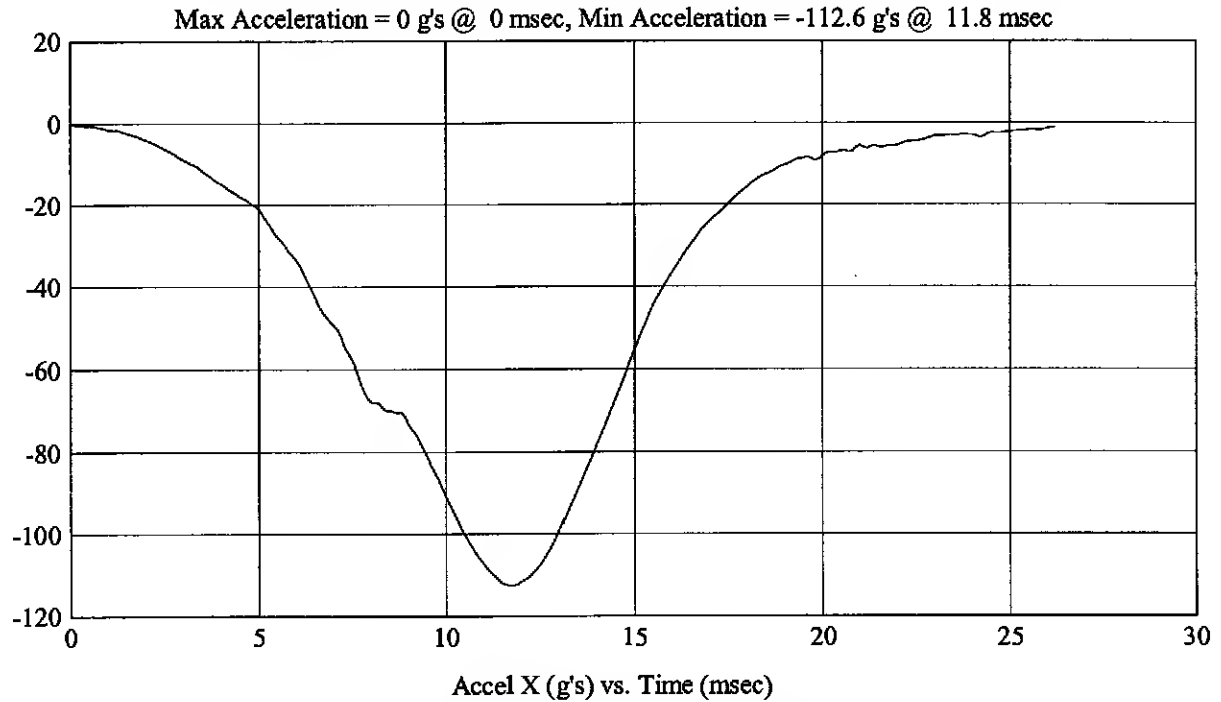


FMH
G04I7-001.7Customer: LAND ROVER
Test # 5
FM4095
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: UR5
Vehicle Side: Right
Horz/Vert Angle: 90/36

HIC(d) = 589, HIC = 560, Delta T = 8.1 msec



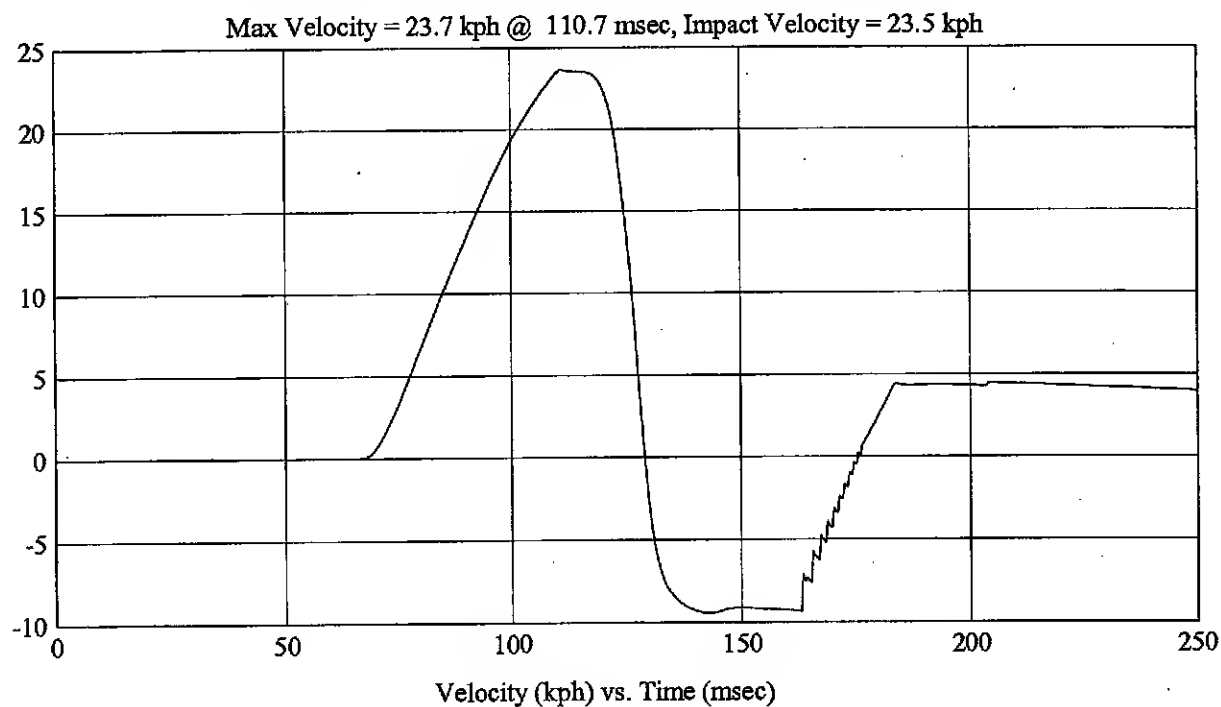
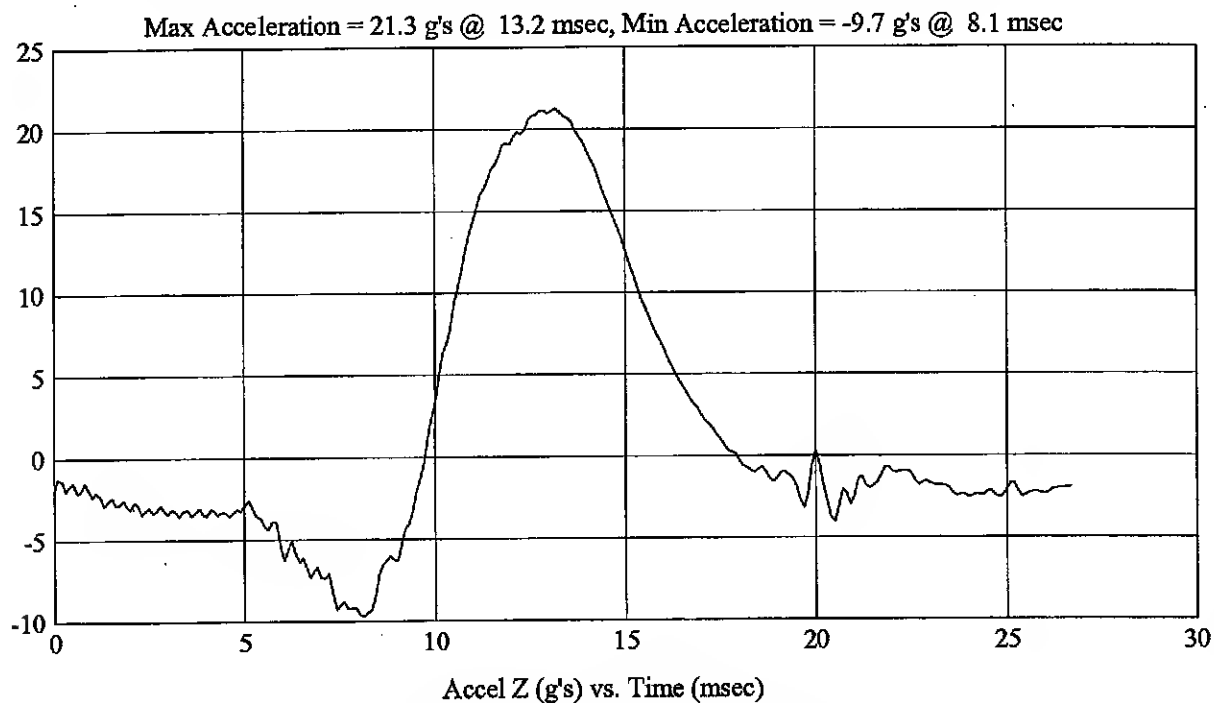
FMH
G04I7-001.7Customer: LAND ROVER
Test # 5
FM4095
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/20/04

Model Year: 2004
Target: UR5
Vehicle Side: Right
Horz/Vert Angle: 90/36

HIC(d) = 589, HIC = 560, Delta T = 8.1 msec

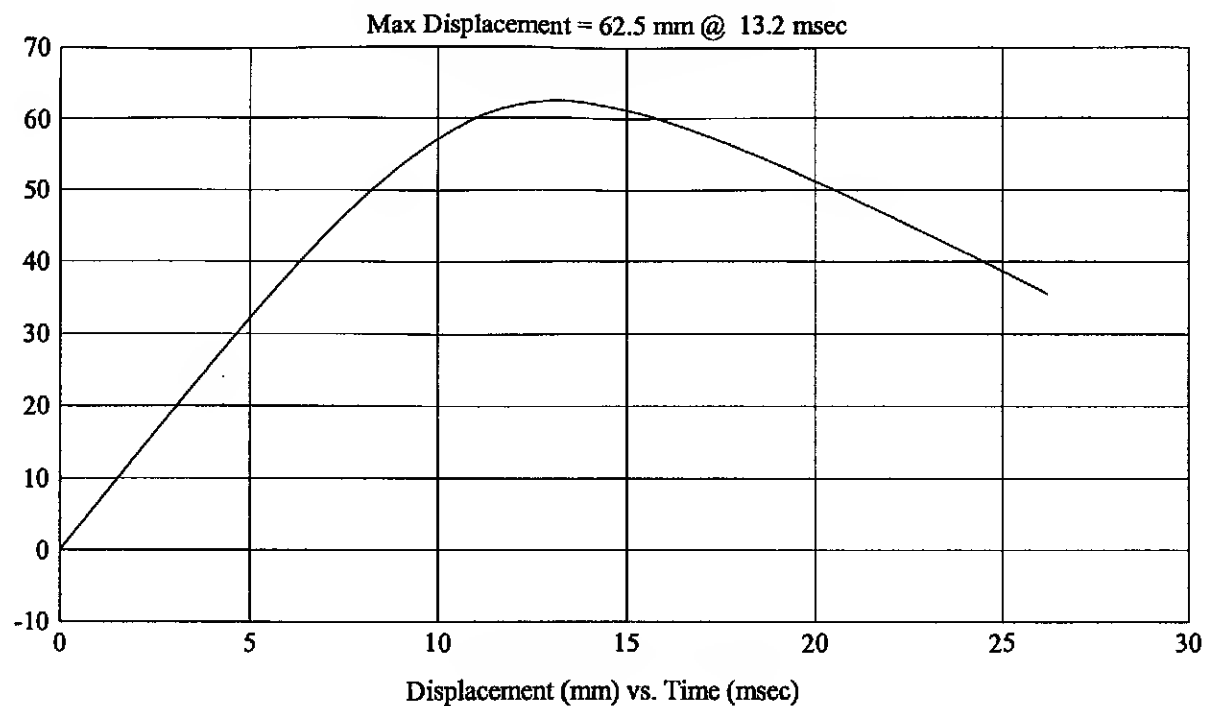


FMH
G04I7-001.7Customer: LAND ROVER
Test # 5
FM4095
Additional Desc: N/A

Vehicle Program: FREELANDER

Model Year: 2004
Target: UR5
Vehicle Side: Right
Horz/Vert Angle: 90/36

HIC(d) = 589, HIC = 560, Delta T = 8.1 msec



_____mga

Impact Testing

4/21/04

G0417-0017

004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST#7 RIGHT UR6

H/V IMPACT ANGLE= 90 / 38

FM4097

PRE-TEST

Inga

Impact Testing

4/21/04

GC417-001.7

004 LAND ROVER FREELANDER

FMVSS 201U - UPPER INTERIOR

C40602 TEST#7 RIGHT UR6

H/V IMPACT ANGLE= 90 / 38

FM4097

POST TEST

7093

Impact Testing

4/21/04

G0417-001.7

2004 LAND ROVER FREELANDER

HVSS 201U - UPPER INTERIOR

C40602 TEST#7 RIGHT UR6

HV IMPACT ANGLE= 90 / 38

FM4097

POST TEST

MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATP201U_FRAME #2.4

DOC. NO.: MGATP201U_FRAME #2
REVISION NO.: 5
PAGE 9 OF 9

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: C40602 VEHICLE YR/MAKE/MODEL: 2004 LINO NOVEL

GENERAL TEST PARAMETERS:

Test Number: 7

Target (Vehicle Side): left/right U26

Temperature: 24 °F/C

MGA Test Reference No.: FM4047

Humidity: 37 %

Approach Angles: Horizontal 90 °

Time of Test: 9:19 am/pm

Vertical 38 °

FMH Serial No: 35

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
769	799	5.9	23.6	14	12

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-91.8	1.20	1.20
Y	6	J35919	94.1	1.23	1.23
Z	7	J36382	84.3	1.51	1.51

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.): _____

NO VISIBLE DAMAGE

Recorded By: [Signature] Approved By*: Heidi A. Kaloto Date: 4/21/04

*Only necessary for NHTSA (Government) Compliance testing.

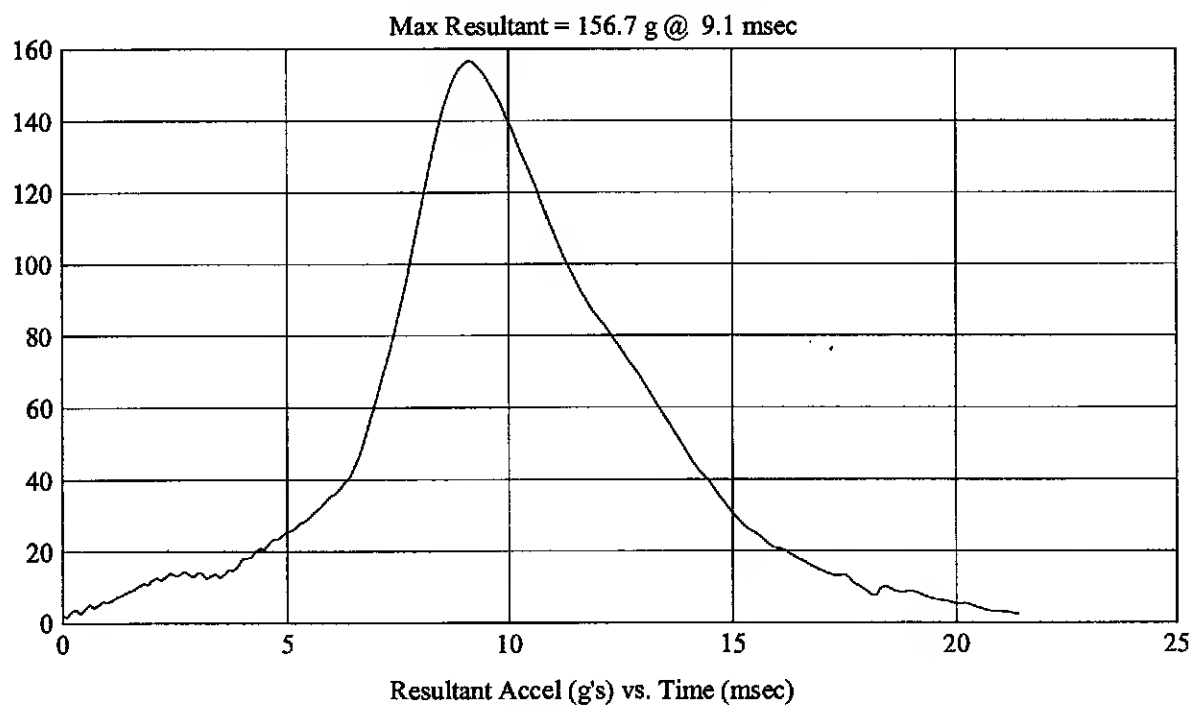
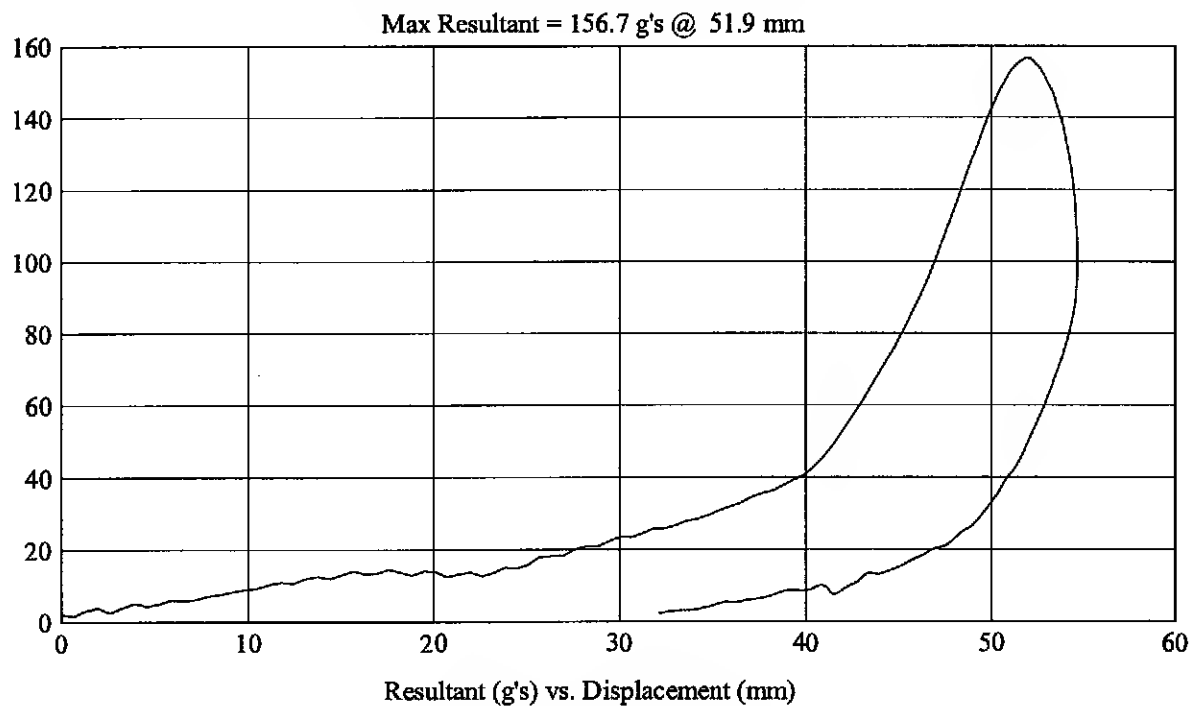
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 7
FM4097
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/38

HIC(d) = 769, HIC = 799, Delta T = 5.9 msec

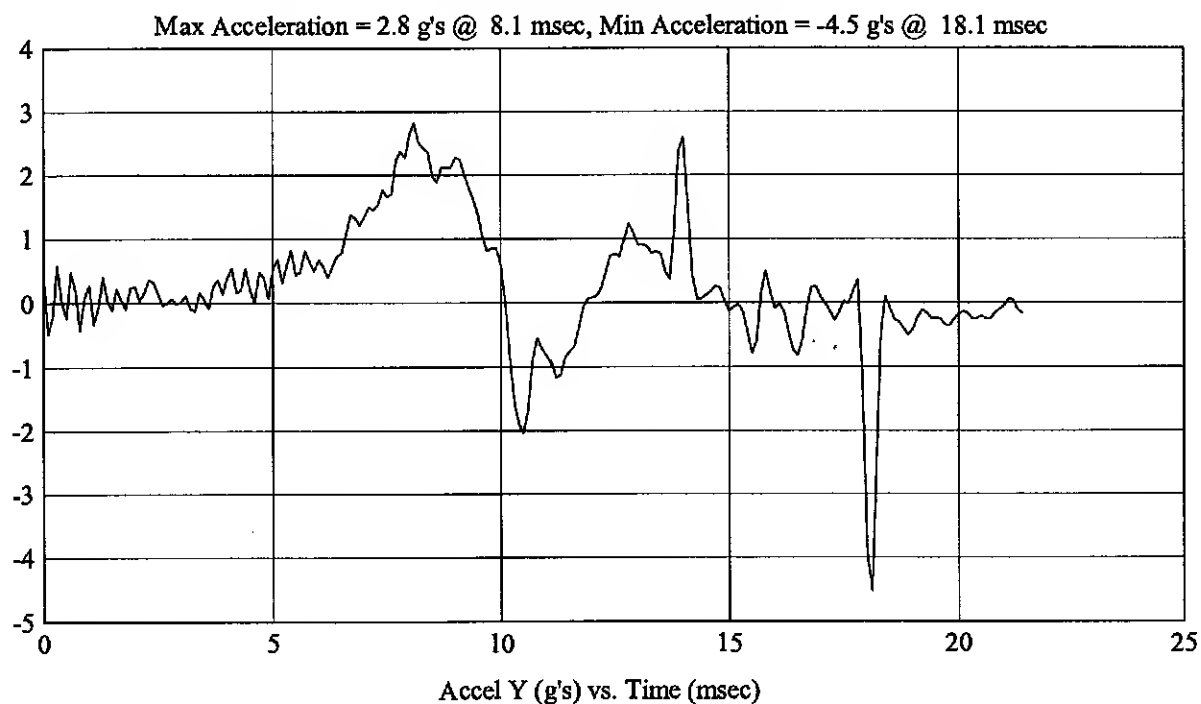
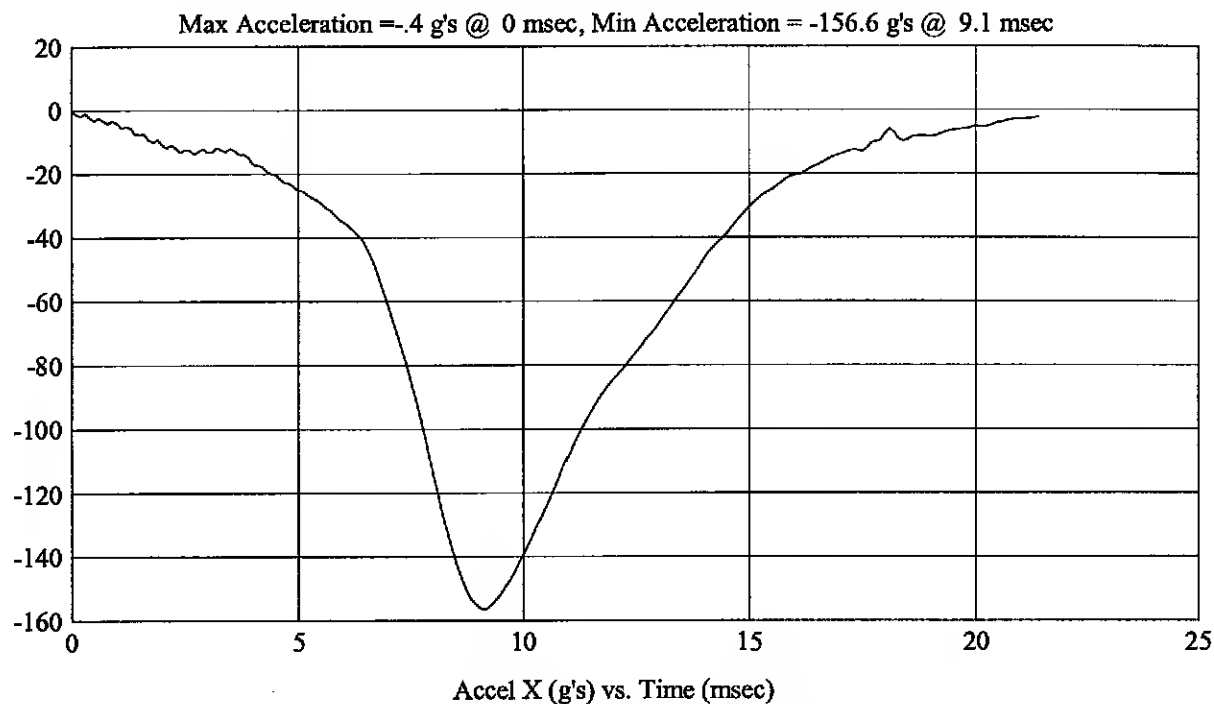


FMH
G0417-001.7Customer: LAND ROVER
Test # 7
FM4097
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/38

HIC(d) = 769, HIC = 799, Delta T = 5.9 msec



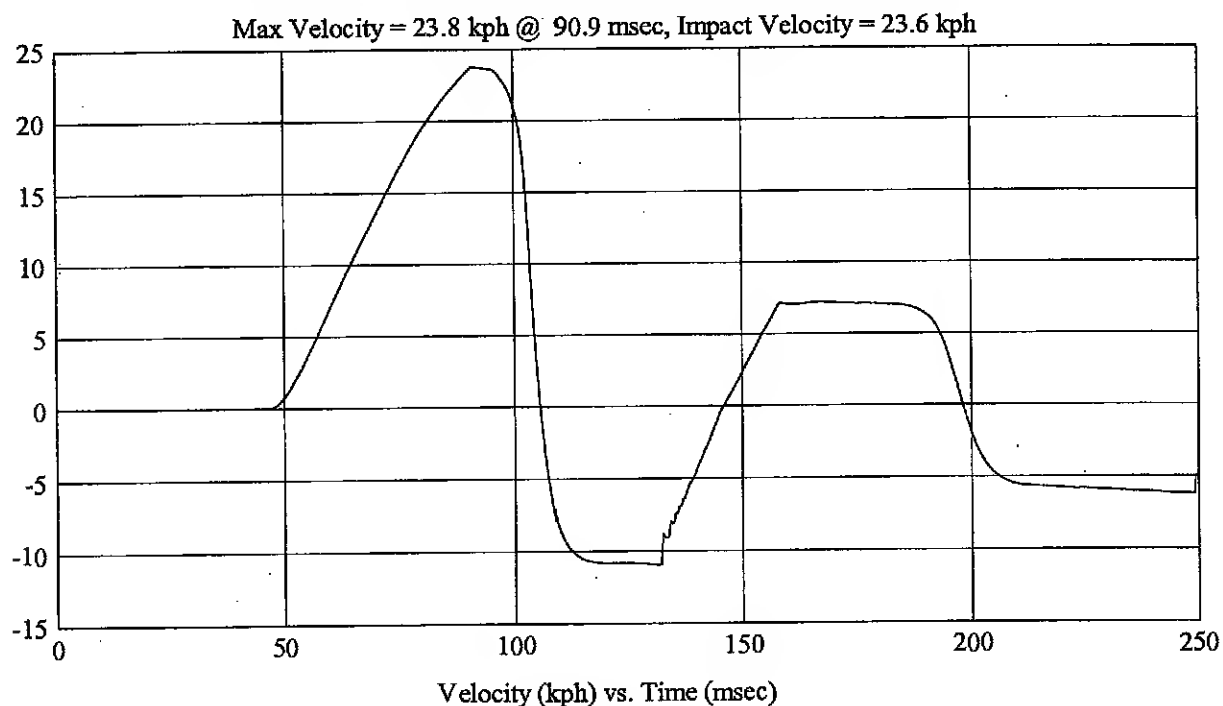
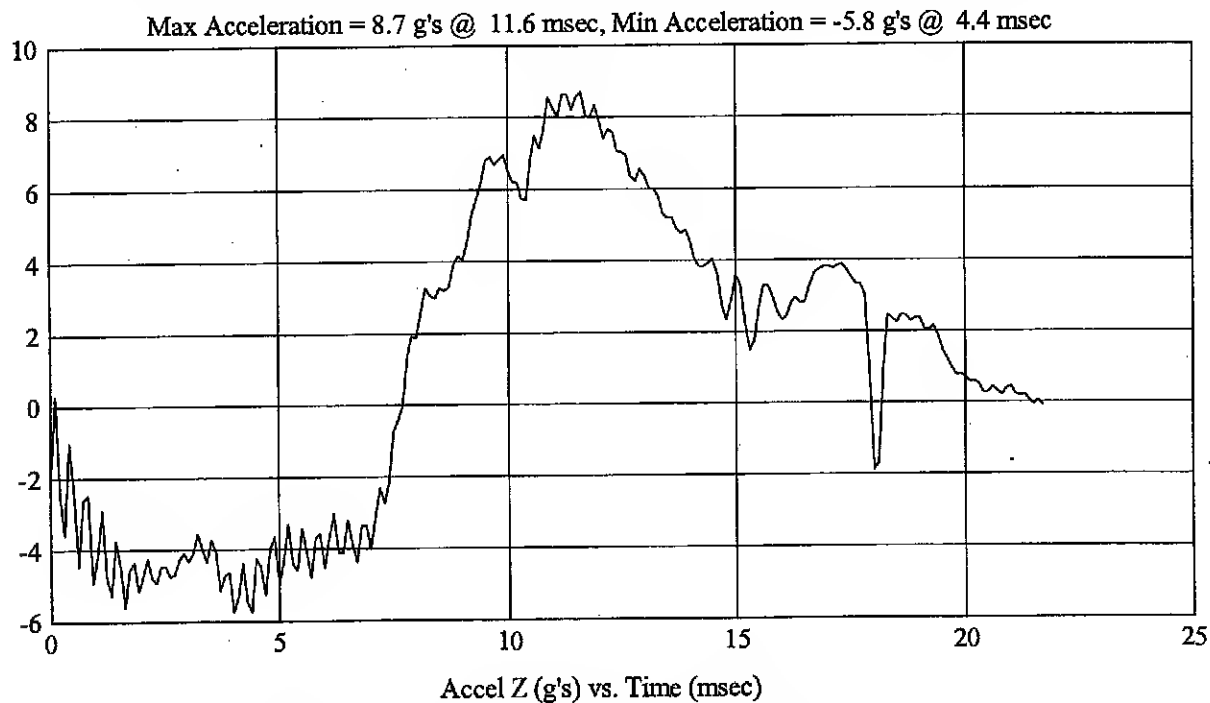
FMH
G04I7-001.7Customer: LAND ROVER
Test # 7
FM4097
Additional Desc: N/A

Vehicle Program : FREELANDER

Test Date: 4/21/04

Model Year: 2004
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/38

HIC(d) = 769, HIC = 799, Delta T = 5.9 msec



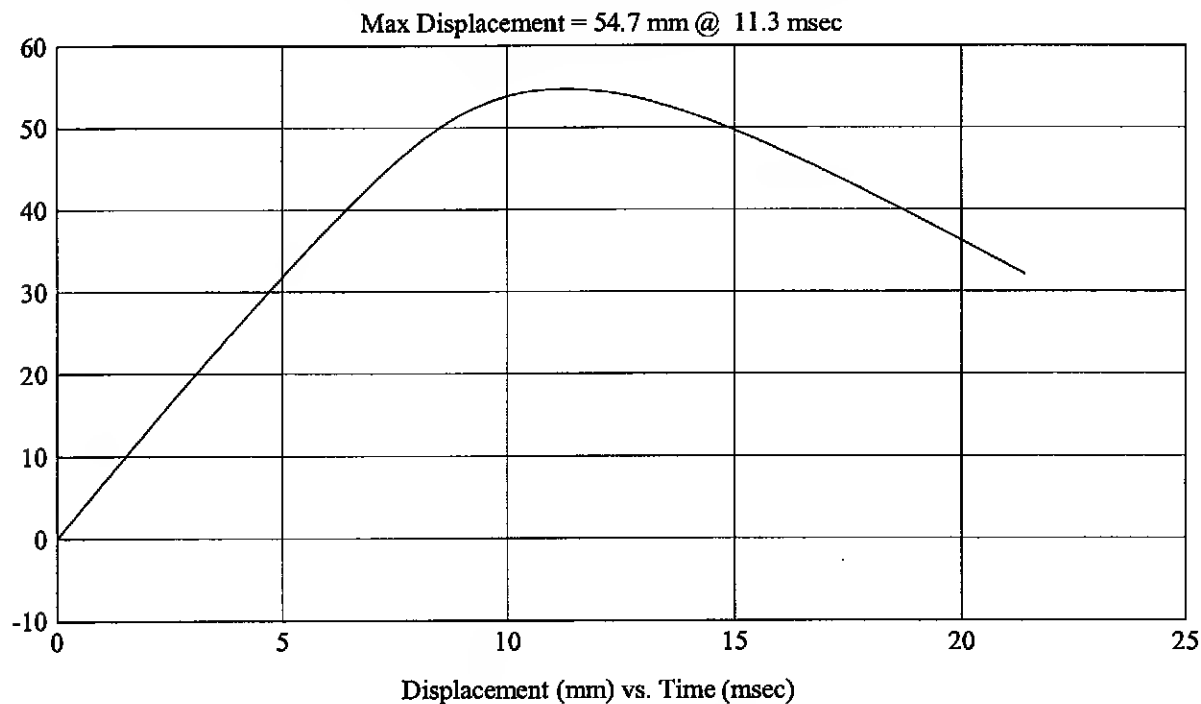
FMH
G04I7-001.7

Customer: LAND ROVER
Test # 7
FM4097
Additional Desc: N/A

Vehicle Program : FREELANDER

Model Year: 2004
Target: UR6
Vehicle Side: Right
Horz/Vert Angle: 90/38

HIC(d) = 769, HIC = 799, Delta T = 5.9 msec



4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the compliance test series. Items marked with an asterisk are calibrated by an external lab. An additional summary table is given for the pre and post-test calibration data for the Free Motion Headforms. The temperature trace to confirm testing was conducted between 66°F and 78°F (19°C - 26°C) is included in Appendix A.

TABLE 4-1 LIST OF ITEMS USED

ITEM	MANUFACTURER NAME	MODEL #	FUNCTION OF ITEM	ACCURACY	CAL. INTERNAL
Head Drop Tower (includes test frame and DAS)	MGA Research Corp.	MGA-100-DC	FMH Calibration	N/A	N/A
Accelerometers	Endevco	7264-2000	Acceleration Data	±0.5%	6 months
*Digital Inclinometer	Mitutoyo	Pro 360	Set Angle of FMH/Targeting	0.1°	Annual
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	035 036 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Kodak	RO1000	Record Event	N/A	N/A
*FARO™	Faro Technologies	S08059801273	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Protractor	Stanley N/A Craftsman	291 & 325 -- --	Measurement Targeting FMH setup Horizontal Measurement	1 mm N/A 0.5°	Annual
*Vehicle Scale 9804-022/9805-175	Cardinal	8950F	Weighing Vehicle	± .5 kg	Annual
* Scale	Detecto	AP-20	Weigh FMH Head	± 0.01 lb	Annual
*Temperature Recorder	Dickson	TR-320	Record Temperature and Humidity	± 1°C ± 1% RH	Annual

TABLE 4-2 FMH CALIBRATION SUMMARY DATA SUMMARY TABLE

FMH Serial #		Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#35	10.02	24	28	236.4	5.0	Yes
Post	#35	10.02	25	55	244.9	4.9	Yes
Pre	#36	10.03	24	28	260.3	9.1	Yes
Post	#36	10.03	25	55	260.0	7.9	Yes
Pre	#38	9.99	25	39	252.8	4.9	Yes
Verify (AP3)	#38	9.99	24	27	250.7	4.6	Yes
Post	#38	9.99	25	55	249.7	2.7	Yes

Calibration certificates and headform calibration information can be found in the P572L Performance Calibration report which accompanies this report.

RECORDED BY: David G. Gotwals

DATE: April 21, 2004

APPROVED BY: Helen A. Kaleto







WED BY LANCROVER IN THE UK

01004 | CYMRT 2050KG (4542LB)

11: 1050KG (2301LB)

ES: 15000 INCH AT 20MPA (0.05) COLD

ES: 15000 INCH AT 20MPA (0.05) COLD

ES: 15000 INCH AT 20MPA (0.05) COLD

ES: 15000 INCH AT 20MPA (0.05) COLD

12: 1050KG (2301LB)

ES: 15000 INCH AT 20MPA (0.05) COLD

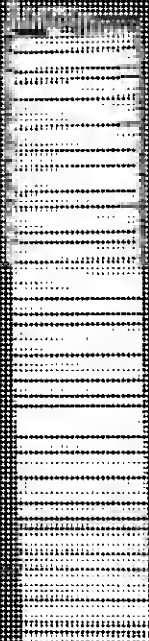
ES: 15000 INCH AT 20MPA (0.05) COLD

ES: 15000 INCH AT 20MPA (0.05) COLD

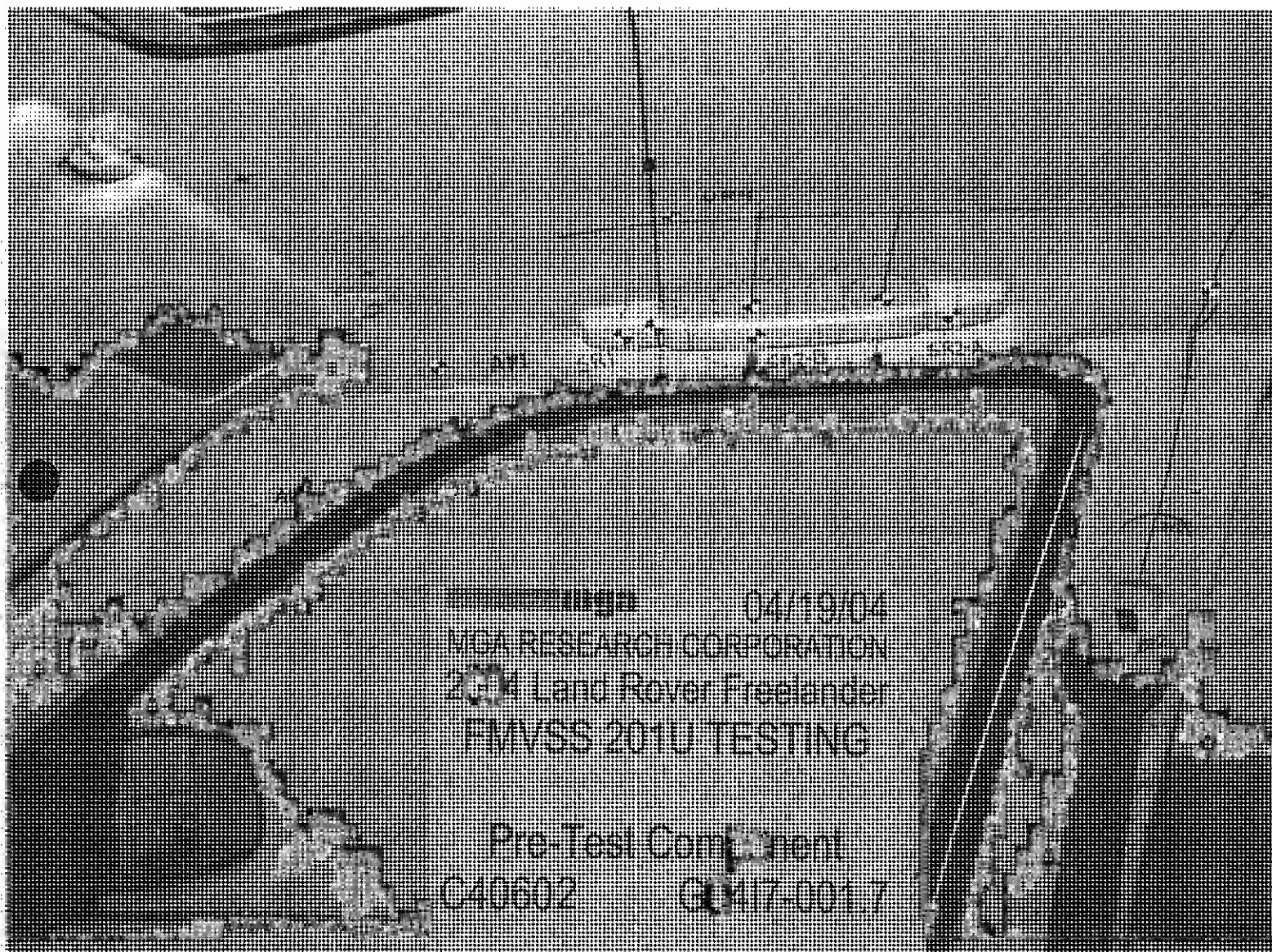
ES: 15000 INCH AT 20MPA (0.05) COLD

NOTE CONFORMS TO ALL APPLICABLE
RAIL VEHICLE MOTOR SAFETY AND
EVENING STANDARDS IN EFFECT ON
E OF MANUFACTURE SHOWN ABOVE

LN22254A412481

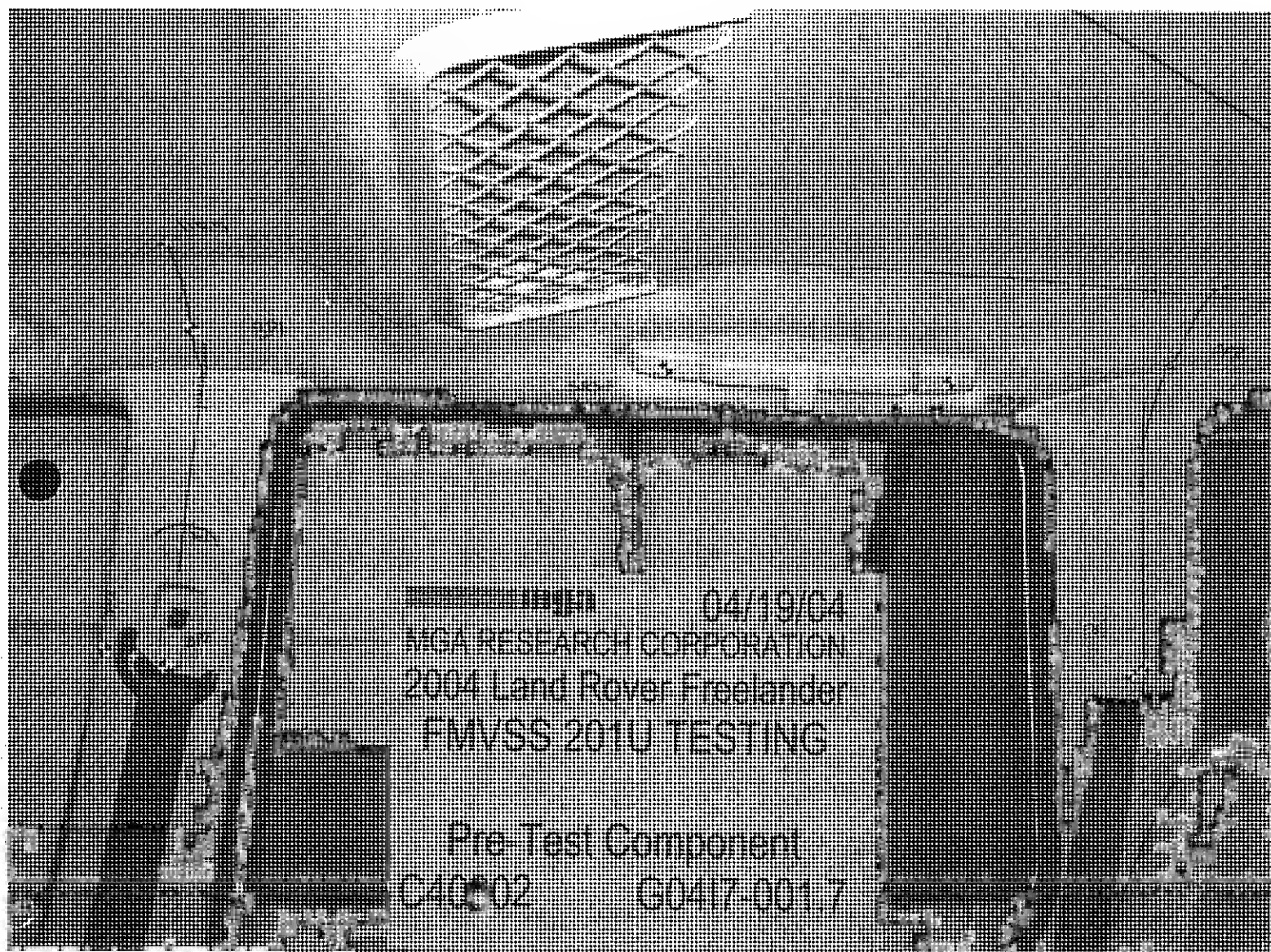


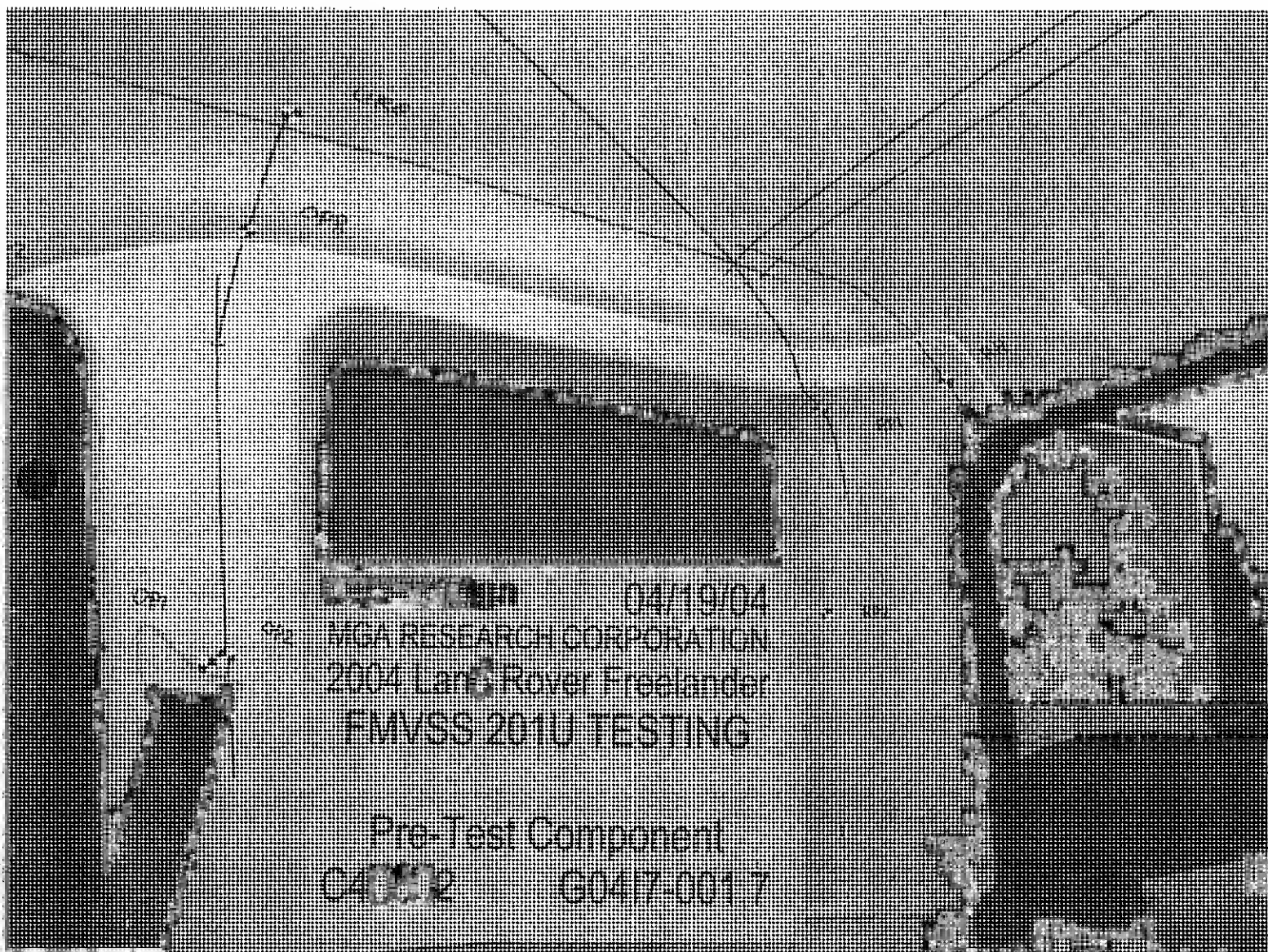
4PV PAINT: 603 TRIM: TBS



04/19/04
MCA RESEARCH CORPORATION
2004 Land Rover Freelander
FMVSS 201U TESTING

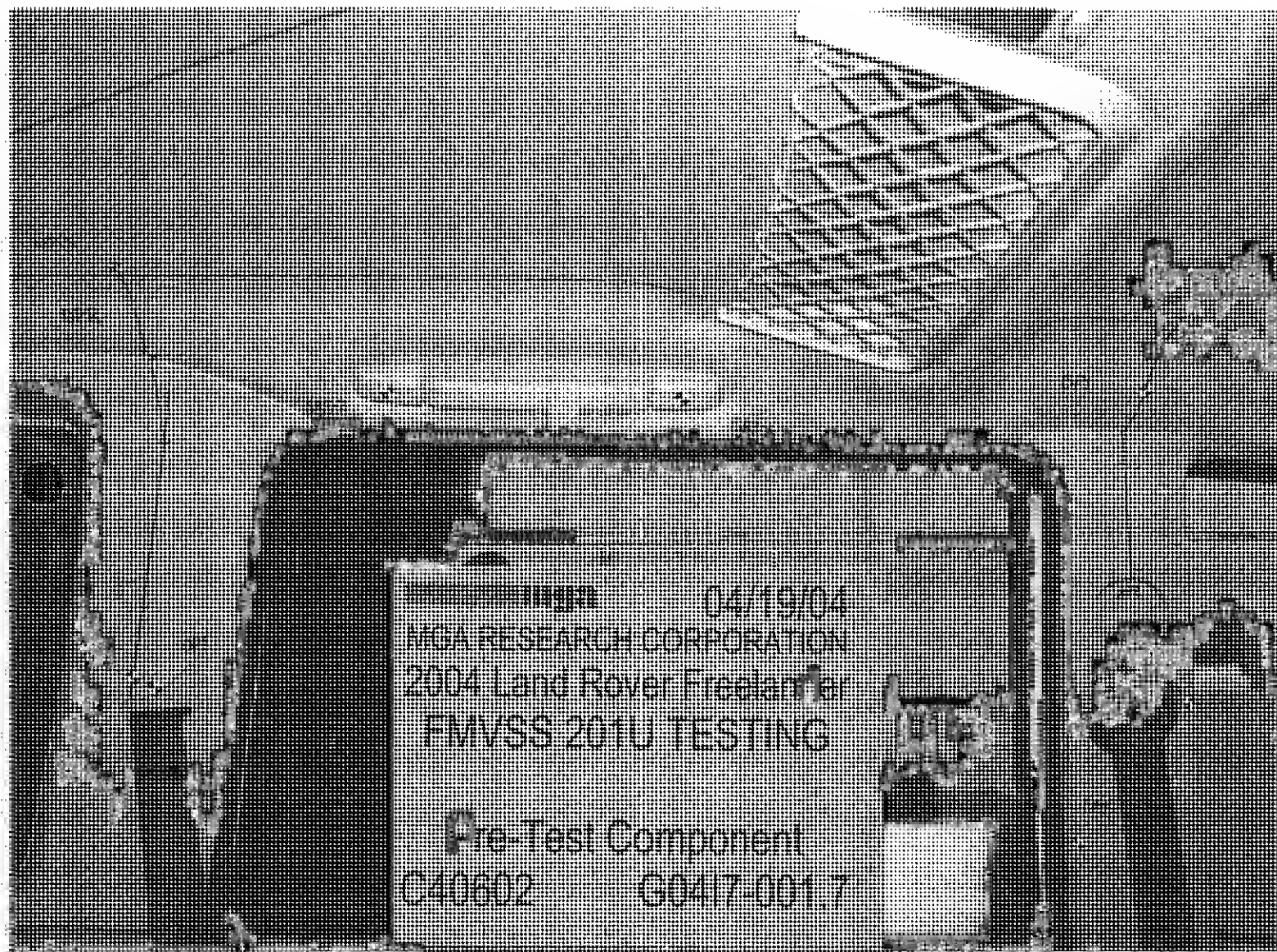
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C40602 C417-001.7

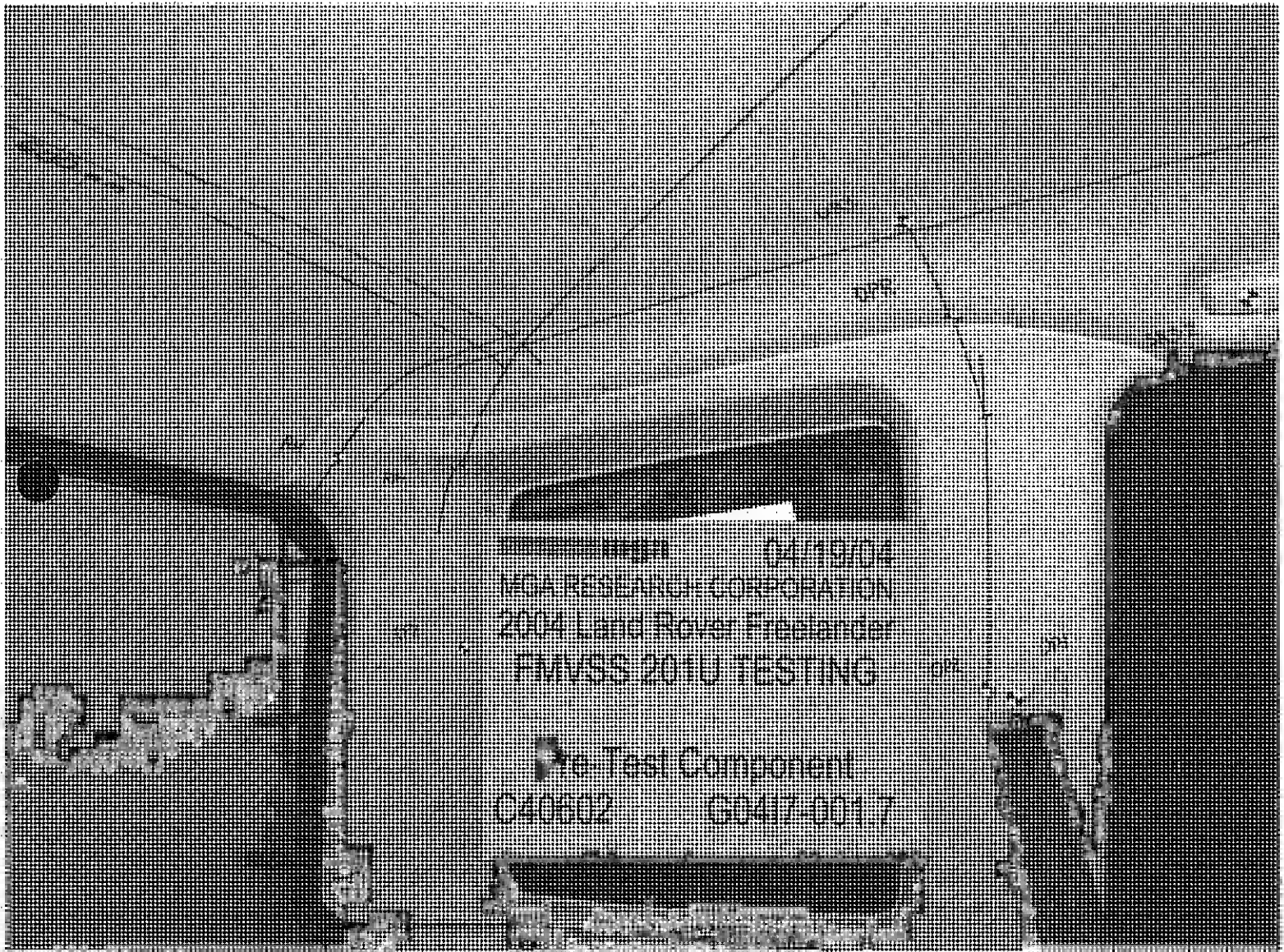




04/19/04
MSA RESEARCH CORPORATION
2004 Land Rover Freelander
FMVSS 201U TESTING

Pre-Test Component
C40602 G0407-0017





04/19/04
MCA RESEARCH CORPORATION
2004 Land Rover Freelander
FMVSS 2010 TESTING

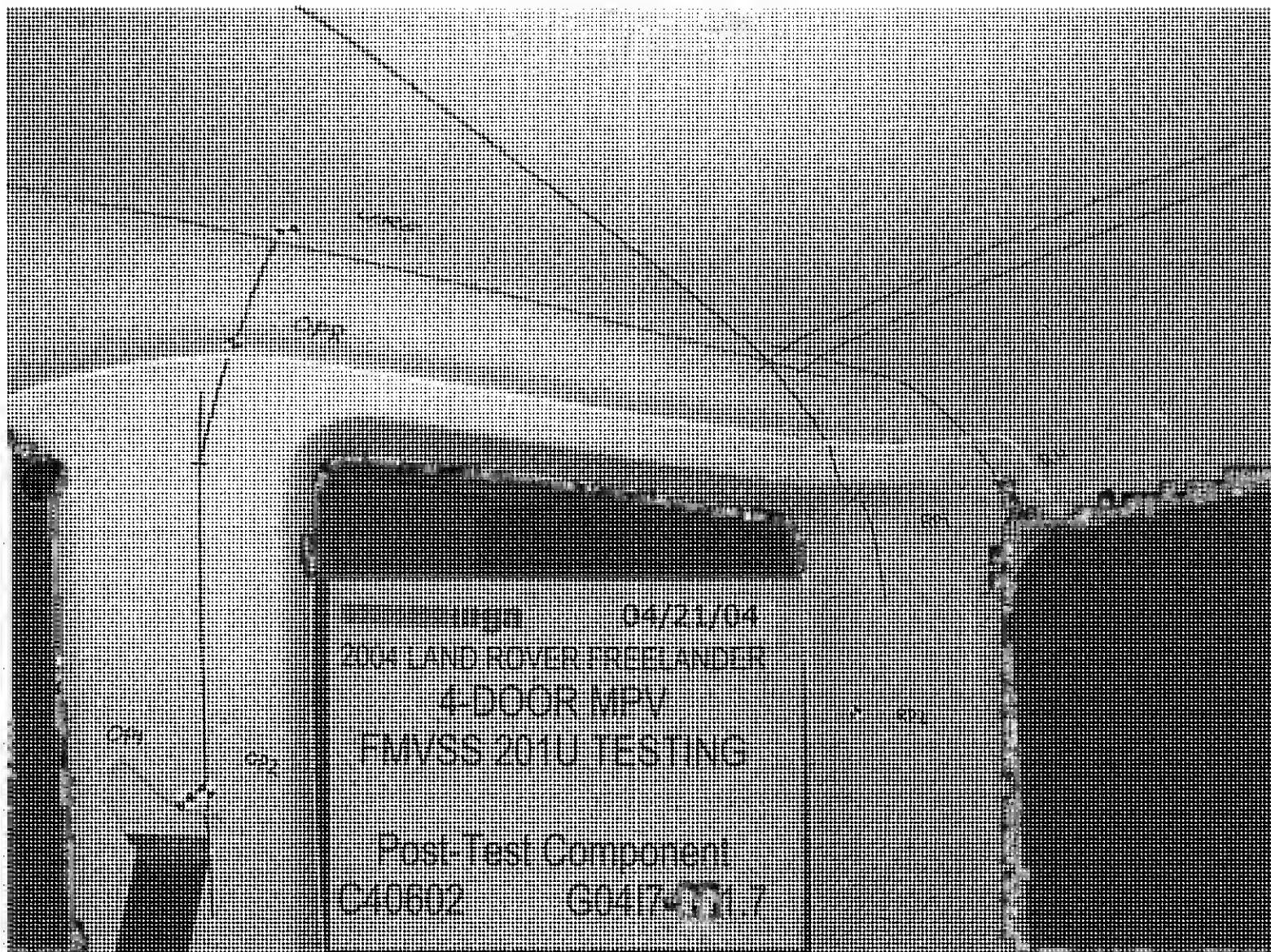
Pre-Test Component
C40602 G0417-001.7

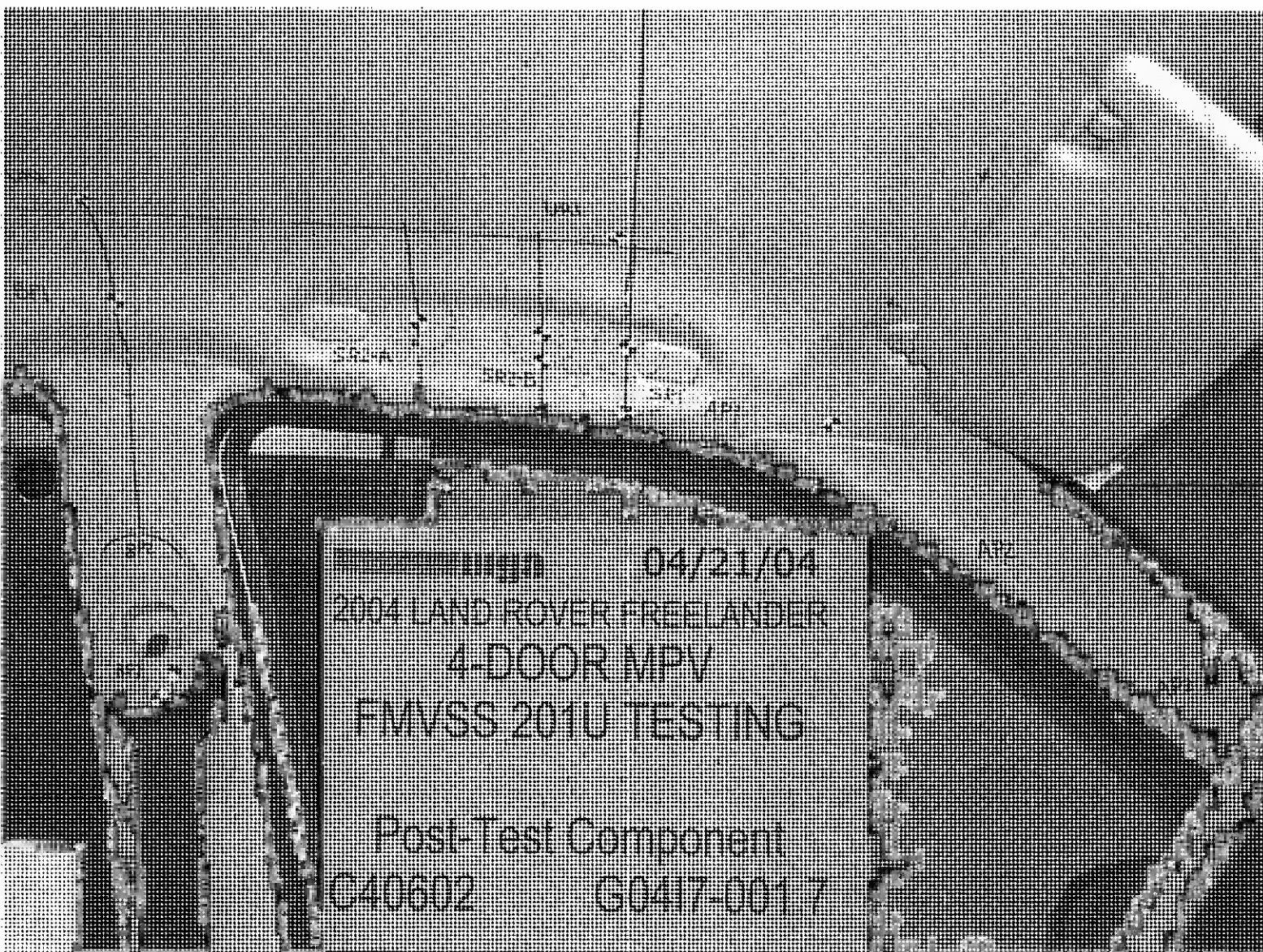


04/21/04
2004 LAND ROVER FREELANDER
4-DOOR MPV
FMVSS 201U TESTING

Post-Test Component
C40602 G0417-017

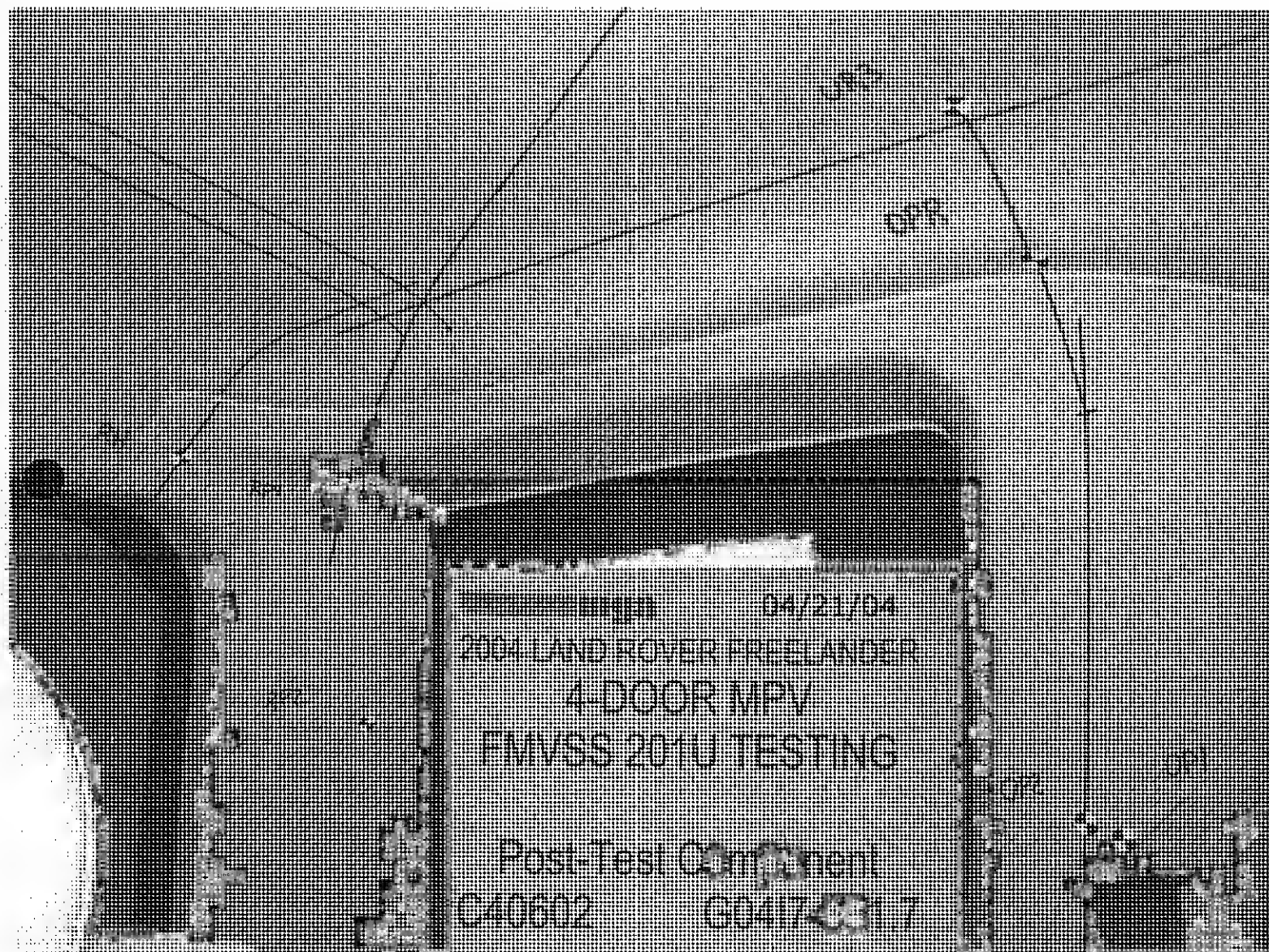






2004 LAND ROVER FREELANDER
4-DOOR M-UV
FMVSS 201U TESTING

Post-Test Component
C4C802 G0417-0017





16. FORMS....Continued

LABORATORY NOTICE OF APPARENT TEST FAILURE TO OVSC

FMVSS NO.: 201U

TEST DATE: April 20th, 2004LABORATORY: MGA RESEARCH CORPORATIONCONTRACT NO.: DTNH22-99-C-11005; DELV. ORDER NO.: DTNH22-04-P-11112LABORATORY PROJECT ENGINEER'S NAME: DAVID GOTWALSTEST SPECIMEN DESCRIPTION: 2004 LANDROVER FREELANDERVEHICLE NHTSA NO.: C40602 VIN: SALNY22254A4MFR: LANDROVER IN THE UK

APPARENT TEST FAILURE DESCRIPTION: A-PILLAR TARGET #3 (AP3), LOCATED ON THE LOWER PORTION OF THE A-PILLAR. THE HORIZONTAL AND VERTICAL ANGLES WERE 152 AND 31 DEGREES RESPECTIVELY. THE CALCULATED HEAD IMPACT CRITERIA(d) WAS 1062, AT AN IMPACT VELOCITY OF 23.9 KPH.

FMVSS REQUIREMENT, PARAGRAPH S THE HIC(d) SHALL NOT EXCEED 1000 WHEN CALCULATED IN ACCORDANCE WITH THE FOLLOWING FORMULA $HIC(d) = 0.75466(HIC) + 166.4$ WITH $HIC = \frac{1}{t_2 - t_1} \left[\int_{t_1}^{t_2} A_z dt \right]^{2.5}$ WHERE $A_z = [A_x^2 + A_y^2 + A_z^2]^{1/2}$. t_1 AND t_2 ARE ANY TWO POINTS IN TIME DURING THE IMPACT EVENT SEPARATED BY NOT MORE THAN 36 MILLISECONDS

NOTIFICATION TO NHTSA (COTR): KAREN NUSCHKEDATE: 4/22/04 BY: DAVID GOTWALS

REMARKS:

TEMPERATURE TRACE C40602 4/19-21/04

